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TRANSCRIPT OF RECORD.

SUPREME COURT OF THE UNITED STATES.

OCTOBER TERM, 1884.

No. 259.

JAMES B. CLARK, APPELLANT,

vs.

THE BEECHER MANUFACTURING COMPANY AND D. F. SOUTHWICK.

APPEAL FROM THE CIRCUIT COURT OF THE UNITED STATES FOR THE DISTRICT OF CONNECTICUT.

FILED AUGUST 22, 1882.

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1 Circuit Court of the United States, District of Connecticut.

JAMES B. CLARK
vs.
THE BEECHER MANUFACTURING COMPANY and D. F. SOUTHWICK. } In Equity.

And now the above-named complainant, after the final decree herein entered on the 20th day of March, 1882, comes and shows to this court that the said final decree involves the construction of the acts of Congress concerning patents for useful inventions; and it appearing to this court that it is reasonable to allow an appeal herein to the Supreme Court of the United States, the same is hereby allowed, and the appellant is ordered to serve the usual citation according to law.

N. SHIPMAN,
District Judge.

2 Know all men by these presents, that I, Lucas C. Clark, of Southington, in the county of Hartford, and State of Connecticut, am holden and firmly bound unto The Beecher Manufacturing Company and D. F. Southwick, both of Meriden, in the county of New Haven, and State of Connecticut, in the sum of three hundred (300) dollars, to be paid to them, their heirs, executors, administrators, and assigns, to which payment, well and truly to be made, I do bind myself, my heirs, executors, and administrators, by these presents. Signed with my hand, and sealed with my seal, at Hartford, this 2d day of March, A. D. 1882.

The condition of this obligation is such that, whereas at a term of the circuit court of the United States in and for the district of Connecticut, holden at Hartford, on the third Tuesday of September, 1881, in a suit in equity depending in said court, between James B. Clark, as complainant, and said Beecher Manufacturing Company and D. F. Southwick, as defendants, a decree was rendered in favor of said defendants and against said complainant, dismissing his said bill, from which said decree said complainant has filed an appeal to the Supreme Court of the United States, for the reversal of said decree.

Now, therefore, if said appellant shall prosecute his said
3 appeal to effect, and answer all costs if he fails to make his appeal and plea good, then this obligation shall be void; otherwise to remain in full force and virtue.

LUCAS C. CLARK. [L. S.]

Signed, sealed, and delivered in presence of—
N. SHIPMAN.
J. F. DONOHUE.

Approved March 2d, 1882.

N. SHIPMAN,
District Judge.

4 Circuit Court of the United States, District of Connecticut.

JAMES B. CLARK
vs.
THE BEECHER MANUFACTURING COMPANY and D. F. SOUTHWICK. } In Equity.

By the Honorable Nathaniel Shipman, one of the judges of the circuit court of the United States for the district of Connecticut, in the second circuit, to The Beecher Manufacturing Company and D. F. Southwick:

Whereas James B. Clark, complainant herein, have lately appealed to the Supreme Court of the United States from a final decree lately rendered and entered in said cause, made in favor of you, the said The Beecher Manufacturing Company and D. F. Southwick, and have filed the security required by law, and you are therefore hereby cited to appear before the Supreme Court of the United
5 States, at the city of Washington, in the District of Columbia, on the 2nd Monday of October, A. D. 1882, to do and receive what may appertain to justice to be done in the premises.

Given under my hand at the city of Harford, in the District of Connecticut, in the second circuit, this 2d day of March, 1882.

N. SHIPMAN,
District Judge.

5½ DISTRICT OF CONNECTICUT, *ss:*

TOWN OF MERIDEN, *March 4th*, 1882.

Then and there I made service of this citation by leaving a true and attested copy thereof in the hands of the within-named D. F. Southwick, and at the same time I left a like true and attested copy in the hands of the secretary of the within-named Beecher Manufacturing Company in said town of Meriden.

Attest:

GEO. R. BILL,
Deputy Marshal.

Fees:

Services	4 00
Copies	1 00
Travel	2 40
	$7 40

6 Circuit Court of the United States, District of Connecticut.

JAMES B. CLARK *v.* THE BEECHER M'F'G CO.

Be it remembered that on the 30th day of October, 1878, there was filed in court a bill in equity, in the words and figures following, viz:

7 United States Circuit Court, District of Connecticut.

JAMES B. CLARK
v.
THE BEECHER MANUFACTURING CO. and D. F. SOUTHWICK. } In Equity.

To the honorable the judges of the circuit court of the United States within and for the district of Connecticut:

James B. Clark, of the town of Southington, in said State and district, and a citizen of said State, brings this his bill of complaint against The Beecher Manufacturing Company, a joint stock corporation, organized under the laws of the State of Connecticut, and located and doing business at Meriden, in said State and district, and a citizen of said State, and against D. F. Southwick, of Meriden, in said State and district, who is a director in and secretary of said company.

And thereupon your orator complains and says that heretofore, and before the twenty-fifth day of June, A. D. 1867, James B. Clark, your orator, was the true, first, and original inventor of a new and useful improvement in the manufacture of shackle blanks, not known or used by others before his invention thereof, and which, at the time of his application for a patent, as hereinafter mentioned, had not been in public use for more than two years with his consent and allowance.

And your orator further shows unto your honors that the said James B. Clark, being, as aforesaid, the first and original inventor and discoverer of said improvement, and being a citizen of the
8 United States, made application to the Commissioner of Patents for letters patent therefor, in accordance with the then existing acts of Congress, and having duly complied in all respects with the conditions and requirements of said acts, on the said twenty-fifth day of June, A. D. 1867, letters patent of the United States, numbered 66130, signed by the Secretary of the Interior and countersigned by the Commissioner of Patents, and sealed with the seal of the Patent Office, all in due form of law, for the said invention or discovery were granted and issued to the said James B. Clark, your orator, whereby was secured to your orator, his executors, administrators, heirs, and assigns, for the term of seventeen years from said twenty-fifth day of June, A. D. 1867, the full and exclusive right of making, using, and vending to others to be used the said improvement, as by said letters patent, or a certified copy thereof, ready in court to be produced, will fully appear.

And your orator further shows unto your honors that by virtue of the premises your orator is the sole and exclusive owner of said letters patent and the invention and improvement described therein, and of all the rights and advantages granted and secured thereby, and that he has expended large sums of money, and has been to great trouble in and about said invention, for the purpose of introducing said improvement and making the same profitable to himself and to the public, and that said invention has been and is of

great benefit and advantage to the public and to your orator, and large numbers of shackle blanks have been made according to and involving said invention, and by virtue of said letters patent, by your orator or his licensees, and that the public has generally acknowledged and acquiesced in the aforesaid rights of your orator, as secured by the said letters patent, and your orator believes that he will realize and receive large gains and profits therefrom if infringement by said defendants and their confederates shall be prevented.

And your orator further shows unto your honors that the invention and improvement in the manufacture of carriage shackles described and claimed in the said letters patent is employed and used by the said defendants.

Yet the defendants, well knowing the premises and the rights secured to your orator as aforesaid, and contriving to deprive him of the benefits and advantages which might and otherwise
9 would accrue unto him from said invention, after the granting of said letters patent, and before the commencement of this suit, did, without license or allowance, and against the will of your orator, and in violation of his rights, and in infringement of the said letters patent, unlawfully and wrongfully, and in defiance of the rights of your orator, make and use and employ the said invention and improvement patented in and by said letters patent, and still continues so to do, and threatens to make and use the same largely, and to supply the market with carriage shackles made by, under, and through the said invention and improvement, to your orator's great and irreparable loss and injury, whereby your orator has been and is still deprived of great gains and profits which he might, and otherwise should have, obtained, but which have been received and enjoyed by said defendant by and through the aforesaid unlawful acts and doings, and the plaintiff has been damaged otherwise.

And your orator further shows unto your honors that the said defendants have realized large profits and advantages from the infringement of the aforesaid letters patent, and to which your orator is entitled, but how much exactly your orator does not know, but prays discovery thereof.

And your orator prays that the defendants may be compelled, by a decree of this court, to account for and pay over to your orator all such gains and profits as have accrued or arisen to or been earned or received by said defendants from the use of said invention and improvement in making carriage shackles in accordance with the specifications of said letters patent, and in infringement thereof, and in addition to pay the damage sustained by your orator from such infringement. And your orator says that the use of said invention and improvement by the defendants, and the avowed determination to continue the aforesaid unlawful acts, in disregard and defiance of the rights of your orator, has the effect to induce others to venture to infringe your orator's rights as aforesaid.

And your orator further shows that the defendants had notice of said infringement, and have been requested to refrain and desist

therefrom, but they have refused so to do, and still continue to use and employ said improvement and invention secured to your orator as aforesaid.

10 Forasmuch as your orator can have no adequate relief except in this court, and as said proceedings are contrary to equity, to the end, therefore, that the defendants may show, if they can, why your orator should not have the relief hereby prayed, and may upon their several corporal oaths, to the best and utmost of their knowledge, remembrance, information, and belief, just, true, direct, and perfect answer make to all and singular the matters and things hereinbefore stated and charged as fully and particularly as if severally and separately interrogated thereto.

And your orator prays that the said defendants may be compelled to account for and pay over to your orator all such gains and profits as has accrued to them from said improvement in the manufacture of carriage shackles, according to the description in said letters patent.

And your orator further prays that the said defendants, their servants, agents, attorneys, and workmen, each and every of them, may be enjoined and restrained by an injunction issuing out of and under the seal of this honorable court from directly or indirectly making, constructing, using, vending, delivering, working, or putting into practice, operation, or use, or in any way imitating or counterfeiting the said invention and improvement described and claimed in said letters patent numbered 66130, or any part thereof, and that said letters patent may be decreed to be valid, and the manufacture and use by the said defendants an infringement thereof, and that the defendants may be decreed to pay the costs of this proceeding, and that your orator may have such other and further relief as to this honorable court shall seem meet, and as shall be agreeable to equity.

May it please your honors to grant unto your orator not only a writ of injunction conformable to the prayer of this bill, but also a writ for a preliminary or temporary injunction issuing out of and under the seal of this honorable court enjoining and restraining the said defendants to the same purport and effect as is hereinbefore prayed in regard to said perpetual injunction.

May it please your honors to grant unto your orator the writ of *subpœna ad respondendum*, issuing out of and under the seal of this honorable court, directed to the said The Beecher Manufact-

11 uring Company and the said D. F. Southwick, commanding them to appear on a day fixed before this honorable court, then and there to answer the premises, and to perform and abide by such order and decree herein as to this honorable court may seem required by the principles of equity and good conscience.

And your orator, as in duty bound, will ever pray.

JAMES B. CLARK.

MITCHELL & HUNGERFORD,
Solicitors and of Counsel.

UNITED STATES OF AMERICA, } ss:
District of Connecticut, }

LITCHFIELD COUNTY, NORWOLK, *October 25th*, 1878.

James B. Clark, being duly sworn, deposeth and saith: That he is the complainant in the foregoing bill named, and has read the same and knows the contents thereof.

That the said bill is true of his own knowledge, except as to those matters which are therein stated to be on his information and belief, and as to those he believes it to be true.

Sworn to before me, this 25th day of October, A. D. 1878.

[L. S.] JOSEPH N. COWLES,
Notary Public.

12 And on the same day a writ of subpœna issued out of court, directed to the said respondents, which was duly served and returned, and which, with the return of service endorsed thereon, is in the words and figures following, viz:

13 [L. S.] The President of the United States of America to the marshal of the district of Connecticut sendeth greeting:

You are hereby commanded to summon The Beecher Manufacturing Company, a joint stock corporation organized under the laws of the State of Connecticut, and located and doing business at Meriden, in said State and district, and a citizen of said State, and D. F. Southwick, of Meriden, in said State and district, and a citizen of said State, who is a director in and secretary of said company, to appear before the judges of the circuit court of the United States of America for the district of Connecticut, in the second circuit, in equity, on the first Monday of December, 1878, wheresoever the said court shall then be, to answer a bill of complaint exhibited against said The Beecher Manufacturing Company in said court by James B. Clark, of the town of Southington, in said State and district, and a citizen of said State, and then and there to answer the same, and to do and abide by what said court may decree in the premises.

Make due service and return at least twenty days before said first Monday of December, 1878.

Witness the Hon. Morrison R. Waite, Chief Justice of the Supreme Court of the United States, at Hartford, this 30th day of October, A. D. 1878.

E. E. MARVIN, *Clerk.*

The defendant- are required to enter their appearance in said cause in the clerk's office of said court on or before the day at which this writ is returnable, or, by the rules of said court, said bill will be taken as confessed.

E. E. MARVIN, *Clerk.*

MITCHELL & HUNGERFORD,
New Britain, Conn., Complainant's Solicitors.

13½ UNITED STATES OF AMERICA, }
District of Connecticut, County of New Haven, } *ss:*

MERIDEN, *Novem.* 8, 1878.

Then and there I served the within writ, by delivering to and leaving with D. F. Southwick, the secretary of the within named defendant company a true and attested copy hereof, and I also left another like copy in the hands of D. F. Southwick.

Attest: JOS. D. BATES,
U. S. Marshal.

Fees:

Services	4 00
Copies & end.	2 00
Travel	4 80
Hack	50
	11 30

14 And on the same day Messrs. Mitchell & Hungerford entered their appearance for the complainant. And on the 30th day of November 1878, Messrs. O. H. & J. P. Platt entered appearance for defendants.

And on the 4th day of February, 1879, defendants' answer was filed in the words and figures following, viz:

15 *Respondents' Answer.*

United States Circuit Court, District of Connecticut.

JAMES B. CLARK
vs.
THE BEECHER M'F'G CO. & D. F. SOUTHWICK. } In Equity.

To the hon. the judges of the circuit court of the United States for the district of Connecticut:

The respondents, now & at all times hereafter saving & reserving all rights of exceptions to the manifest errors, imperfections, & insufficiencies of said bill of complaint, for answer thereto, or to so much thereof as they are advised it is material for them to make answer unto, answering, say:

That as to the allegations of said bill, averring the issuing of letters patent to James B. Clark, under date of the 25th day of June, 1867, & that the complainant is now vested with the sole & exclusive right thereto, & has expended money to introduce said invention, & has by himself & licensee made shackle blanks involving said improvement, the defendants has no knowledge, except as they are informed by said bill, & they, therefore, leave the complainant to make such proof as he may be advised is material or necessary.

16

And the respondents, further answering, severally deny that they have employed & used the invention & improvement in the manu-

facture of carriage shackles, described & claimed in the letters patent, described in said bill of complaint, & severally deny that they have, since the granting of said letters patent, & before the commencement of this suit, or at any time, made, used, or employed said invention, the said invention & improvement patented in & by said letters patent, or made, or sold, any shackles blanks, or carriage shackles made by, under, or through said invention & improvement, or have in any way infringed or violated the complainant's alleged letters patent & invention, or that they intend hereafter in any way to violate or infringe the complainant's alleged letters patent & invention.

And the respondents, further answering, deny that the said James B. Clark was the original inventor of the supposed improve-
17 ment in the manufacture of shackle blanks described in the complainant's alleged letters patent, &, on information and belief, aver that the said supposed improvements in said letters patent described, & all substantial & material parts thereof, were, prior to any alleged invention thereof by the said James B. Clark, described in the following letters patent & printed publications, to wit:

Letters patent granted J. P. Thorp May 1, 1860, & reissue of same Sept. 1, 1866, for carriage shaft shackles. Letters patent granted to Wilson W. Knowles April 24, 1866, for carriage shaft shackles. And also said supposed invention was long prior to the alleged invention thereof by said James B. Clark known to & in use by the following-named persons & at the places affixed to their names, respectively.

And the defendants deny having done any wrong or injury to said complainant, or that they have infringed or invaded any of his rights, and the defendants respectfully submit to this court that the complainants have no right to any further answer to said bill of complaint, or any part thereof, than is above given, and no right to any injunction or relief prayed for in said bill, and they deny that any matter or thing in said complainant's bill contained and
18 not herein well and sufficiently answered unto or denied is true to the knowledge or belief of defendants, and pray to be hence dismissed with their reasonable costs in this behalf most wrongfully sustained.

THE BEECHER MAN'F'G CO.,
By HARVEY D. BASSETT, *President.*
DANIEL F. SOUTHWICK.

UNITED STATES OF AMERICA, }
District of Connecticut } *ss:*

Harvey D. Bassett, being duly sworn, says: I am president of The Beecher Manufacturing Company, the respondent corporation herein; I have read the foregoing answer of The Beecher Manufacturing Company to the bill of complaint of J. B. Clark, by me subscribed, and know the contents thereof, and that the same is true, except as to such matters as are therein mentioned or stated on information or belief, and as to such matters I verily believe it to be true.

HARVEY D. BASSETT.

Subscribed & sworn to before me, this 3rd day of February, 1879.
[SEAL.] WILBUR F. DAVIS,
Notary Public.

19 UNITED STATES OF AMERICA, } ss:
District of Connecticut, }

Daniel F. Southwick, being duly sworn, says: I am one of the defendants to the bill of complaint of J. B. Clark against The Beecher Manufacturing Company and Dan'l F. Southwick; that I have read the foregoing answer to said bill of complaint by me subscribed, and know the contents thereof, & that the same is true, except as to such matters as are therein stated on information and belief, & as to such matters I verily believe it to be true.
DANIEL F. SOUTHWICK.

Subscribed & sworn to, this 3rd day of February, 1879, before me—
WILBUR F. DAVIS,
Notary Public.

[Endorsed:] No. 121. U. S. circuit court, district of Connecticut. James B. Clark *vs.* The Beecher Manuf'g Co. Answer. Filed Feb. 4th, 1879. E. E. Marvin, clerk. (Copy.)

And on the 26th day of February, 1879, the complainant filed his replication to said answer in the words and figures following, viz:

20 Circuit Court of the United States, District of Connecticut.
In Equity.

JAMES B. CLARK *v.* THE BEECHER M'F'G CO. *et al.*

The replication of the complainant to the answer of the respondent.

The repliant, now and at all times hereafter saving and reserving unto himself all and all manner of advantage of exception to the manifold insufficiencies of the said answer, for replication thereunto says, that he will aver and prove his said bill to be true, certain, and sufficient in the law to be answered unto; and that the said answer of the defendant is uncertain, untrue, and insufficient to be replied unto by this repliant, without this, that any other matter or thing whatsoever in said answer contained, material or effectual in the law to be replied unto, confessed and avoided, traversed or denied, is true; all which matters and things the repliant is and will be ready to aver and prove, as this honorable court shall direct; and humbly prays as in and by his said bill he has already prayed.
Dated at New Britain, this 26th day of February, 1879.
MITCHELL & HUNGERFORD,
Complainant's Solicitors.

21 And on the 21st day of September, 1880, complainant's evidence was filed in the words and figures following, viz:

PLAINTIFF'S EXHIBIT, CLARK'S PATENT.—L. S. B., *N. P.*

(65.)

Department of the Interior, United States Patent Office.

To all persons to whom these presents shall come, Greeting:

This is to certify that the annexed is a true copy from the
22 records of this office of the letters patent granted James B. Clark June 25th, 1867, No. 66130, for improvement in the manufacture of Blanks for Carriage Thill Shackles.

In testimony whereof, I, W. H. Doolittle, acting Commissioner of Patents, have caused the seal of the Patent Office to be hereunto affixed, this eleventh day of June, in the year of our Lord one thousand eight hundred and seventy-nine, and of the Independence of the United States the one hundred and third.

[L. S.] W. H. DOOLITTLE,
Acting Commissioner.

(No. 66130.)

The United States of America to all to whom these letters patents shall come:

Whereas James B. Clark, of Plantsville, Connecticut, has alleged that he has invented a new and useful improvement in the manufacture of Blanks for Carriage Thill Shackles, which he states has not been known or used before such invention; has made oath that he is a citizen of the United States, that he does verily believe that he is the original and first inventor or discoverer of the said improvement, and that the same hath not, to the best of his knowledge and belief, been previously known or used, has paid into the Treasury of the United States the sum of thirty-five dollars, and presented a petition to the Commissioner of Patents praying that a patent may be issued therefor.

These are therefore to grant, according to law, to the said James B. Clark, his heirs, administrators, or assigns, for the term of seventeen years from the twenty-fifth day of June, one thousand eight hundred and sixty-seven, the full and exclusive right and liberty of
making, constructing, using, and vending to others to be used,
23 the said improvement, a description whereof is given in the schedule hereunto annexed and made a part of these presents.

In testimony whereof, I have caused these letters to be made patent, and the seal of the Patent Office to be hereunto affixed.

Given under my hand at the city of Washington, this twenty-fifth day of June, in the year of our Lord one thousand eight hundred and sixty-seven, and of the Independence of the United States of America the ninety-first.

[L. S.] W. T. OTTO,
Acting Secretary of the Interior.

Countersigned and sealed with the seal of the Patent Office.

A. M. STOUT,
Acting Commissioner of Patents.

United States Patent Office.

JAMES B. CLARK, of Plantsville, Connecticut.

Letters Patent No. 66130, dated June 25, 1867.

Improvement in the Manufacture of Blanks for Carriage Thill Shackles.

The Schedule referred to in these Letters Patent and making part of the same.

To all whom it may concern.

Be it known that I, James B. Clark, of Plantsville, in the county of Hartford, and State of Connecticut, have invented a new and useful improvement in Shackle Blanks, and I do hereby declare that the following is a full, clear, and exact description thereof, which will enable others skilled in the art to make and use the same, reference being had to the accompanying drawings, forming part of this specification.

24 This invention relates to the construction of carriage shaft shackle from solid blanks and to the shape of the dies for forming the same, so that with the least amount of labor and power the said shackle may be gradually formed into the required shape. In the annexed drawing this invention is illustrated.

Figure 1 is a vertical sectional view of a shackle blank, showing it between the dies.

Figure 2 is a top or plan view of a shackle blank, as the same is formed by the dies.

Similar letters of reference indicate like parts.

The blank, which is made in the shape of a cross in the usual manner, is placed upon the lower die A, and the upper die B is then forced down upon it, whereby the arms *a a* of the blank are bent into an oblique direction, and the body *b* is curved, as shown in the figure. The portion of the blank where the arms join the body is rounded, as shown on both the inside as well as on the outside, the straightening of the body of the shackle pushing out sufficient material for forming the sharp corners without having any hindersome and impracticable projections. The dies are formed so as to give the blank the required shape.

This process of forming shackle blanks has proved by practice to be the most expeditious and simple yet performed, as it requires the least amount of machinery and forms each part of the shackle with just the required amount and thickness of metal for completing the article.

What I claim as new, and desire to secure by letters patent, is—

1. The carriage shaft shackle blank, so formed between dies that the body *b* of the blank is curved, substantially as herein shown and described.

2. The dies A and B, for making the said blank, when so constructed and arranged as to form the rounded corners and the curved body of the said blank, substantially as herein shown and described.

JAMES B. CLARK.

Witnesses:
SIMEON H. NORTON,
DANIEL WALKER.

25 EXHIBIT No. 3.—L. S. B., *N. P.*

United States Patent Office.

WILLIS B. SMITH, of Plantsville, Connecticut.

Letters patent No. 106,225, dated August 9, 1870.

Improved Die for Forging Carriage Shackle Blanks.

The schedule referred to in these letters patent, and making part of the same.

I, Willis B. Smith, of Plantsville, in the county of Hartford, and State of Connecticut, have invented a new and useful improvement in dies for forming carriage shackle blanks, of which the following is a specification.

My invention consists in the peculiar form of the dies, all as hereinafter more fully described.

In the accompanying drawing—

Figure 1 is a face view of my invention;

Figure 2 is a section of same on line *x x*;

Figure 3 is a plan view of the shackle blank forged in said die;

Figure 4 is an end view of the same; and

Figure 5 an end view of a shackle formed from said blank.

A designates the lower die, and

B the upper one.

a a designates recesses in the die A, in which the ears *b b* are formed, and which recesses are on a straight line and parallel to the face of the dies A and B.

If desired, the recess *a a* can be provided with centers *c c*, to mark the ears *b b* for drilling.

Between the recesses *a a* is an elevation or projection, C, the sides of which are at right angles to the recesses *a a*, and the top of said elevation is parallel to said recesses.

The corners at the junction of the sides and top of elevation, C, are removed, as shown in Fig. 2.

26 At one end of elevation C is another elevation, D, the top of which is flat and even with the top of elevation C, and is broad enough to form the flat part of the clip *d*, as in ordinary shackles.

At the opposite end of the elevation C is an elevation, F, provided with recess *e*, to form the shaft *f*, which is to be rounded and threaded as in ordinary shackles.

In the die B is a recess, E, the bottom of which is parallel to the face of the dies A and B, and the sides of which are oblique to the same, as shown in Fig. 2, and in the blank H formed in the same.

This recess E is immediately opposite or above the elevations C and F in the die A, while opposite the elevation D is a recess, G, to form the rounding side of the clip *d*.

These dies are arranged one above the other in a suitable drop or press, and iron properly heated and of a suitable form is placed in the dies A B and "struck up," which forms the blank H, as shown in Figs. 3 and 4, but with the usual amount of surplus metal projecting from the edges of the same, and which surplus metal is not shown.

By means of the elevation C the corners *h h* at the junction of the ears *b b* and body *g* are formed at right angles to each other. The outside of the ears *b b* are now on the same line, their entire length and the edges of the whole blank H are in a vertical position. The blank H is now placed in an ordinary trimming die and the surplus metal removed. It is then heated and the oblique portion of the body *g* bent, so as to throw the ears *b b* upward in the form shown in Fig. 5, and in which operation of bending the corners *h h*, previously formed at right angles, remain unmolested, whereby I am enabled to form the said corners square and full, while, at the same time, the blank is of a form to be readily trimmed.

I am aware that dies for the same purpose have been previously used, as shown in the patents to L. Burns, June 11, 1867, and J. B. Clark, June 25, 1867.

In Burns' dies the body of the shackle is formed straight, while the ears are curved, the curve commencing at the plane where the ears are to be bent to form the corners, and, therefore, said corners are not right angled, neither is it possible for curved ears to be both on one and the same line.

In Clark's dies the ears are formed straight, but were
27 arranged on different lines, so that the edge of the blank at the side of each ear was thrown out of a vertical line, which seriously interferes with trimming off the surplus metal.

I make no claim to either of the above or similar dies.

I claim as my invention—

1. The dies A and B, for forging carriage shackle blanks, constructed as herein shown and described.

2. The carriage shackle blank H, constructed and formed substantially as shown and described.

WILLIS B. SMITH.

Witnesses:
HEBER S. IVES.
CHARLES H. CLARK.

28 United States Circuit Court, District of Connecticut. In Equity.

JAMES B. CLARK *vs.* THE BEECHER MANUFACTURING CO.

Proofs for final hearing taken on the part of complainant in the above-entitled cause, under and pursuant to the sixty-seventh rule, in equity, before Lyman S. Burr, Esq., notary public, pursuant to agreement of parties, notice of testimony being waived, and both parties being present by counsel.

NEW BRITAIN, CONN., *June 23d*, 1879—10 a. m.

Present: C. E. Mitchell, Esq., counsel for complainant, and J. P. Platt, Esq., counsel for defendants.

JAMES SHEPARD, a witness produced on the part of complainant, being duly sworn, deposes and says:

Ques. 1. What is your name, age, residence, and occupation?

Ans. James Shepard; age 41 years; reside in New Britain, and am by occupation a solicitor of patents.

Ques. 2. State generally what experience you have had in comparing mechanisms with each other, and with letters patent.

Ans. I have been a solicitor of patents ever since 1866, during which time I have almost daily had occasion to compare mechanisms with drawings and specifications of letters patent, and with each other, with a view of ascertaining their difference or resemblance. I have also been frequently called upon to testify as an expert in cases pertaining to letters patent in the United States circuit courts.

29 Ques. 3. What experience have you had as a practical mechanic?

Ans. I have been engaged in different mechanical pursuits for a period extending over about 12 years.

(Plaintiff offers in evidence certified copy of letters patent granted James B. Clark June 25th, 1867, No. 66130, for improvement in manufacture of blanks for carriage-thill shackles, which copy is marked Pl'tf's Exhibit Clark Patent, L. S. B., N. P.)

Ques. 4. Have you read, and do you understand, letters patent Exhibit Clark's Patent; and, if yea, what do you understand to be the invention therein described?

Ans. I have frequently examined a copy of the specifications and drawings of the patent enquired of, and I understand the invention therein described. The patent is for an improvement in the manufacture of blanks for carriage-thill shackles. These shackles are formed with two ears which stand perpendicular to the back or body of the shackle, between which ears a "cockeye" on the end of the thill is received, and a bolt is passed through the ears and eye to connect the parts together. It is desirable to form the shackle with sharp, full, and square corners at the junction of the outside of the ears and back. The object of this invention is to so form the blank which is to form the shackle that when the shackle is formed up in the usual way sufficient material will be pushed out from the back

for forming the sharp corners before referred to. The specification says: "This invention relates to the construction of carriage-shaft shackles from solid blanks, and to the shape of the dies for forming the same, so that with the least amount of labor and power the said shackles may be gradually formed into the required shape." The peculiar novelty of the blanks resides in that portion of it which in the finished shackle is to form the body or back, and it consists in making this portion of the blank curved or crooked, while it is of substantially a uniform thickness, and with parallel sides when viewed on the edge. In the ordinary process of forming this blank into a shackle the back or body is straightened out, and the ears bent up at right angles to it, and held by proper clamping mechanism, so that compressing the back to straighten it upsets the metal in the curved portion, and pushes it out towards the outside corners, to
30 fill any deficiency which may have been caused by bending up the ears, thereby leaving the corner sharp and full. This blank is formed by striking it between two dies, one of which has a matrix which will fit one side of the blank and receive the blank, and the face of the other die corresponds in shape to the other side of the blank. By making the back of the blank curved or crooked, it may be left of a uniform thickness without any attempt to form sharp corners in the blank, or without any surplus metal at that point, such as would constitute a "hindersome and impracticable projection," or, in other words, a blank may be left of such shape that bending up the ears will leave a rounded outside corner, because the straightening of the back or body will upset and push out sufficient material to perfect the corners, and make them sharp and full. The "hindersome and impracticable projections" spoken of in the specifications I understand to refer to an enlargement of a prior shackle blank at certain points, the back of which blank was flat and straight, with parallel sides, except at the points where the ears were to be bent up, at which point there was quite an enlargement of surplus metal which formed prominent projections.

At this point an adjournment was taken to June 25, 1879, at 10 a. m.

NEW BRITAIN, CONN., *June* 25, 1879.

Adjourned to December 24, 1879.

NEW BRITAIN, CONN., *December* 24, 1879—10 a. m.

Present: C. E. Mitchell, Esq., of counsel for complainant, and Hon. O. H. Platt, of counsel for respondent.

Examination of JAMES SHEPARD resumed:

Ans. continued. I have here an exhibit which correctly represents the dies used in the manufacture of carriage shackles for striking the blank into its form. Also a carriage shackle blank as formed by said dies, which I produce to be marked
31 "Clark's Dies and Blanks." This exhibit represents the first step in the manufacture of carriage shackles under this patent; that is to say, the first step in forging the blank after it has been

cut out. The blank as thus formed or forged is then put into its final form by the same mechanism used for forming other blanks into their final form. Heretofore I have spoken of this second step as the ordinary process of forming this blank into a shackle, by which I mean that the peculiar blank is given its ultimate form by any ordinary mechanism or means. I have here a completed shackle, which represents the final form or result of the second step in bending the shackle into shape, which I here introduce, to be marked as Exhibit Clark Shackle. The corners upon the outside at the junction of the body and ears are those which it is the object of the manufacture, set forth in the patent, to produce full and sharp. I have here also another shackle, which I produce, to be marked as Exhibit "Old Style Shackle." This shackle is formed from a straight blank by one bending operation, and it well represents the deficiency in the outside corners, which is incident to bending up the ears from a straight blank. In this shackle it will be noticed that the back was straight to begin with, and does not change its final form in the process of bending up, and that the bend is principally made at the junction of the ears and body. In the patented shackle the ears are formed straight in the first step of forming the shackle, and the subsequent bending which takes place at the second step is principally made in the black or body of the shackle blank.

The first claim of the patent makes special reference to so forming the carriage shackle blank between dies that the body of the blank is curved, which feature is the essential essence of the patented invention.

The second claim makes special reference to the dies in which said blank is formed.

(The exhibits produced by the witness here introduced in evidence and marked, respectively, Clark's Dies and Blanks, L. S. B., N. P.; Exhibit Clark's Shackle, L. S. B., N. P.; Exhibit Old Style Shackle, L. S. B., N. P.)

Q. 5. Please look at the article handed you and state what it is, pointing out what relation, if any, the Clark invention bears to it.

32 (Article handed witness introduced in evidence and marked Mounted Carriage Shackle, L. S. B., N. P.)

Ans. This is a carriage shackle with the cock eye or shaft eye attached, and mounted on a block of wood which is intended to represent a portion of a carriage axle. This is that class of shackles in which it is especially desirable that the corner should be full and square at the back so as to obtain as broad a seat as possible for resting upon the front side of the axle, as illustrated in said exhibit.

(Counsel for complainant places in evidence, to be identified hereafter, a carriage shackle blank, marked Exhibit No. 1, L. S. B., N. P., also dies for forming the same, marked Exhibit No. 2, L. S. B., N. P., also letters patent to Willis B. Smith, No. 106,225, dated August 9, 1870, for improved die for forging carriage shackle blanks, marked Exhibit No. 3, L. S. B., N. P.)

Q. 6. Please examine the Exhibits No. 1, 2, and 3, respectively, and if you say that you understand the same, please compare them with the invention described in the letters patent in suit, pointing out resemblances and differences, and stating whether or not in either of them you find said invention, giving reasons.

Ans. I have examined the Exhibits No. 1, 2, and 3, and I understand the same.

Exhibit No. 1 represents a carriage shackle blank, having a back which is much longer than the back of the finished shackle, which extra length is obtained by making bends in the back, instead of making it straight. This blank I understand is intended to be bent up into substantially the form of "Exhibit Clark Shackle," and in doing so the back will be straightened and upset so as to push out stock to make full and square corners, the same as I have already described as a result of bending the curved back of the Clark blank. The ears in this "Exhibit No. 1" are formed straight to begin with, and the subsequent bending operation is accomplished by bending the back. In this blank, Exhibit No. 1, the ears are both in one plane, instead of in different planes, as shown in the Clark's patent. This difference I consider an immaterial one, as the only difference in the second bending operation is that the back will have to be bent a little more than the back of the blank described in the
33 Clark's patent. This is a difference in degree, and not in kind. I also notice that the deviation from a straight line in the portion of the blank Exhibit No. 1 which is to be formed into the body or back of the shackles is made up of a series of angular bends, the effect of which is to increase the length of that portion, and produce precisely the same result as the curved back described in the patent. I consider these angular bends the full equivalent of the curved back. For these reasons I am of the opinion that the blank Exhibit No. 1 fully and completely embodies that step in the manufacture of carriage shackle blanks which is specially referred to in the first claim of the Clark patent.

The exhibit No. 2 represents die blocks for forming the blank "Exhibit No. 1," and therefore are necessarily formed with faces which fit the blank, or rather depressions of the converse forms. The blank being the blank described and referred to in the first claim of the Clark patent. It necessarily follows that the dies for forming it embody the same features of construction as the dies described in the Clark patent, and specially referred to in the second claim thereof. The difference in the dividing lines of the dies, whereby the matrix which forms the blank is partially on each side of the said line, instead of wholly on one side of the said line, is an immaterial difference commonly practiced in making dies. Exhibit No. 3 shows and describes shackle blank and dies for forming it, which are substantially the same as Exhibits Nos. 1 and 2. The blank, however, shown in this exhibit is represented with an additional feature, which is most clearly shown in the points marked *h h* in figure 4 of the drawing, which consists of an enlargement of the stock at the points which are to form the final corners of the shackle, which may be considered as embodying the projection on

prior blank which I have heretofore described. These prominent corners in connection with the bent back are not necessary, but their presence at any event is in the nature of a mere addition to the bent back, and do not in any manner take away, lessen, or change the peculiar advantages or functions derived from the curved back. I am of the opinion, therefore, that the blank and its dies, described in Exhibit No. 3, fully and clearly embody all the essential features in the manufacture of carriage blanks described in the Clark patent, and referred to in both the claims thereof.

34 Ques. 7. Please compare drawings No. 4 and 5 of the letters patent to W. B. Smith, Exhibit No. 3, with reference to the distance between the inner corners of Fig. 5, as compared with the distance between the angles which are to become the inner corners, shown in Fig. 4, and state what the difference in distance represents.

Ans. I find in Fig. 5 that the length of the back as measured from corner to corner, upon the inside of the ears, is a scant three-fourths of an inch. I find that the sum of the three planes between the first corners from the ends of the ears on the upper side of Fig. 4 to be an inch and an eighth. These three planes constitute that portion of the blank which in Fig. 5 are inside of the inner corners, between the ears, showing that this portion of the blank is shortened fully three-eighths of an inch, in the process of forming up, measuring from the outer ends of the ears inward to the first corner of the upper side of Fig. 4, the distance is thirteen-sixteenths of an inch. The distance from the ends of the ears on the inside of Fig. 5, down to the corner at the back, is also thirteen-sixteenths of an inch, showing that the ears are not bent or changed in length during the process of forming up, and that all of the bending and changing the shape of the metal in the second step of the forming process resides in bending the back, also that the first angle from the ends of the ears inward on the upper side of Fig. 4, is the point where the inner corner at the junction of the ear and back will be, when bent into the form shown in Fig. 4.

Cross-examined by Hon. O. H. PLATT, of counsel for respondent:

X-Q. 8. Do I understand you to give it as your opinion that the construction of a shackle-blank as described in letters patent granted to Smith, Exhibit No. 3, is covered by the complainant's letters patent in this case?

Ans. I intended to be so understood, and such is my opinion.

X-Q. 9. You obtained the Smith patent as his solicitor, did you not?

Ans. I did.

X-Q. 10. Did you then think that the construction of a shackle blank as described in the Smith patent would be covered by the complainant's patent?

35 Ans. My opinion was not solicited upon that point, and I paid no special attention to it. I do not remember of ever

having any different opinion upon that point from the one I now have.

X-Q. 11. You say you are familiar with the Smith patent, Exhibit No. 3; will you state what is the special feature of the invention secured by that patent, as you understand it?

Ans. The essential features which are set forth as new reside in the carriage shackle blanks in which the ears are formed straight, and in the same plane, and in which the back deviates from a straight line, and having right angular corners at the junction of the straight and curved portions of the blank, and upon the inside of this bend in the blank, also the dies having such a shaped matrix as to form this peculiar shaped blank. The peculiar advantage of making the right angular corners in connection with their bent back is that the blank may be enlarged by an increase of metal at said points without having it project out from the blank so as to be in the way, thereby making the outside surface of the ears in the same plane, which facilitates trimming off the usual fin which is thrown out between the dividing line of the dies.

X-Q. 12. I understand you to give it as your opinion that making the ears of the shackles in Exhibit No. 1 in a straight line does not cause it to differ materially from the shackle described in complainant's letters patent, shown in Exhibit Clark's Die and Blank; am I right?

Ans. If you understood me as confining myself to the peculiar feature and advantages of the curved back and body of the blank described in the Clark patent, and Clark die and blank, you are right.

X-Q. 12. In your direct examination you said, "The ears in this Exhibit No. 1 are formed straight to begin with, and the subsequent bending operation is accomplished by bending the back. In this blank Exhibit No. 1 the ears are both in one plane, instead of in different planes, as shown in the Clark patent, which difference I consider a immaterial one, as the only difference in the second bending operation is that the back will have to be bent a little more than the back of the blank described in the Clark patent." Do you wish to qualify this statement in any respect?

36 Ans. I think that the language quoted clearly refers to the bending of the back. I see no reason for qualfying it.

X-Q. 13. You say that "body or back of the shackle Exhibit No. 1 is made up of a series of angular bends." Please explain more fully what you mean by "angular bends"?

Ans. I mean that the deviation from a straight line in the back is formed of lines which intersect each other with a much more appreciable angle than do the indefinite number of straight lines which go to make up a circle.

X-Q. 14. Do the indefinite number of straight lines which go to make up a circle show an appreciable angle?

Ans. No.

X-Q. 15. I understand you also to be of the opinion that at the back of shackle blank Exhibit No. 1 is only an equivalent of the curved back of the shackle blanks in the Clark patent; am I right?

Ans. I should not put it in that form. I used the word equivalent because there was an appreciable difference in the form, but in function I fail to find any appreciable difference, and I hesitated a little to decide whether I should say that this back was an equivalent or the same thing as the back of the shackle described in the Clark patent. But I did not wish to be understood by saying that it was an equivalent to say that it was not the same in function and in fact, except in mere form. To say that it was only an equivalent I think would imply that it was not the same.

X-Q. 16. Will you tell me, then, what feature is embraced in the Smith patent which is not covered by the complainant's patent?

Ans. The improvement in the Smith patent which is not shown or claimed in the Clark patent resides in the ears formed in one plane, and the enlargement of the blank by an addition of the metal at the point which in the finished blank is to form the right angular corner, and which enlargement is all made upon the inner curved side of the blank. These improvements, however, have for their foundation—that is, they are built upon—the blank with the crooked body shown and described in the Clark patent, and consequently it would be impossible to use the improvements patented in the Smith patent without practicing also the invention upon which it is founded, to wit, that shown in the Clark patent.

37 X-Q. 17. Was the improvement described in your last answer all that you supposed that you was obtaining the patent for when you obtained the Smith patent, Exhibit No. 3?

Ans. Yes; that blank and the dies for forming it, the blank and dies being one inseparable invention, or rather necessarily a simultaneous one.

X-Q. 18. Will the blank shown in "Exhibit Clark's Die and Plan" be shortened by the bending operation next in order in the manufacture of shackles?

Ans. Yes.

X-Q. 19. To the same extent as shackle blank Exhibit No. 1?

Ans. That will depend upon the final width of the finished shackle, that is, the length of the back in said shackle. This can be varied a little if desired, but take the blank No. 1, and the blank described in the Clark patent made of proportionately the same size, and the finishing process being equal and adapted to them in the same sized shackle, the backs will be upset to the same extent as far as I can observe.

X-Q. 20. The object of the curved back in the Clark shackle blank, is that the shackle by the subsequent bending operation shall have a straight back and outer square angles, is it not?

Ans. That is the final result obtained by the curved back in said shackle.

X-Q. 21. Were not shackles made with flat backs and outer square angles previous to the Clark's process patent?

Ans. Yes.

X-Q. 22. Then your "Exhibit Old Style Shackle" is not intended to represent the latest improvements in the state of the art up to the time of the Clark patent, is it?

Ans. No; it is only intended to show the result which follows from bending up the ears from a straight and flat blank.

Redirect by C. E. MITCHELL, Esq., counsel for complainant:

R. D. Q. 23. Are you aware of any method of securing the flat back and square corners which involved the straightening out of a body previously curved, whether that curvature was regular or angular which antedates the Clark patent?

Ans. I am not.

R. D. Q. 24. To what method other than the method of
38 pushing out material for forming the sharp corners by straightening a previously bent body of the blank, do you refer in reply to X-Q. 22 as the improvement in the art prior to the time of the Clark patent?

Ans. To the prior method described in my direct examination, which consisted of large prominent projections formed on the blank at the point where the ears are to be bent, as shown by the blank, which I herewith produce.

(Blank referred to by witness offered in evidence, and marked Exhibit 4, L. S. B., N. P.)

R. D. Q. 25. Suppose the blank described in the Smith patent had the bent feature eliminated from its body, and retained the slight enlargements at *h h* in Fig. 4, would those enlargements alone be of any practical value in securing full, square corners upon the back of the finished shackles, giving reasons?

Ans. They would do something towards filling out the corners a little more than they are in the "Exhibit Old Style Shackle," but they would be insufficient to bring out anything like good full square or sharp corners, because the enlargement of the metal is not sufficient to fill the loss of metal which would be occasioned by bending up the ears.

R. D. Q. 26. On the other hand, suppose the slight enlargements at *h h* were wholly left off, as they are left off on Exhibit 1, but the bent back feature was retained as in Exhibit 1, what would be the case then as to the corners being made square and full, if the ears were bent up by proper and usual mechanism?

Ans. The corners would be formed sharp and full, because the straightening of the back would push out sufficient metal to fill the corners.

R. D. Q. 27. What do you understand Exhibit No. 4 to be?

Ans. A carriage shackle blank, as made by H. D. Smith & Co., in their regular manufacture of carriage shackles.

JAMES SHEPARD.

Subscribed and sworn to before me, this 24th day of December, A. D. 1879.

Attest:

LYMAN S. BURR,
Notary Public.

At this point an adjournment was taken to December 29th, 1879, at 9.30 a. m.

39 NEW BRITAIN, CONN., *December 29th*—9.30 a. m.

Present: Charles E. Mitchell, Esq., of counsel for complainant, and Hon. O. H. Platt, of counsel for defendant.

LUCAS C. CLARK, a witness produced on the part of the complainant, being duly sworn, deposes and says:

Ques. 1. What is your name, age, residence, and occupation?

Ans. Lucas C. Clark; age 34 years; reside in Plantsville, Conn.; and by occupation, a merchant and manufacturer.

Ques. 2. Please look at Complainant's Exhibit No. 1, L. S. B., N. P., and state if you know what it is, and by whom it was made, and your means of knowledge?

Ans. It is a carriage shackle blank ready to be formed up. It was made by the Beecher Manufacturing Co., of West Meriden. I know it by the fact that it was given me by one of the officers of the corporation as a sample of the blanks that they were making and using in the manufacture of shackles.

Ques. 3. When, where, and by what officer was the shackle blank Exhibit No. 1 given you, and under what circumstances?

Ans. It was given me, I think, in the latter part of 1874, or early part of 1875, but I could not say very positively as to the particular date. It was given me at their office by Mr. Beecher, who was then, I think, the president of the concern, but I could not say positively. My brother, James B. Clark, and myself went to inform them that they were infringing, and that we wanted them to stop or make arrangements. We asked them for a sample of the blanks they they were making and using, and Mr. Beecher gave us Exhibit No. 1 as a sample.

Ques. 4. Are you able to say positively whether or not Exhibit No. 1 was handed to you and your brother, as you have stated, by Mr. Beecher before this suit was brought, and after the date of the patent in suit?

Ans. It was handed to us before this suit was brought, and after the date of the patent in suit.

Ques. 5. What is Mr. Beecher's full name?

Ans. Henry M. Beecher, I think.

39½ Ques. 6. State whether or not, when you went as you have stated to inform them that they were infringing, this Mr. Beecher appeared to be, and assumed to be, in charge of defendants' works?

Ans. He did.

Ques. 7. Did the defendant company either stop or make arrangements as required?

Ans. They did neither.

Ques. 8. State whether you have at any time seen the operation of making shackles at the defendants' works; if so, when it was, and whether before or after the interview with Mr. Beecher of which you have spoken?

Ans. I saw them making shackles, or making blanks, and forming them up, about the middle of 1876, and this was after the interview with Mr. Beecher.

Q. 9. State the process as you observed it carried on at defendants' works, describing the form of the blanks employed as compared with Exhibit No. 1.

Ans. The form was the same as Exhibit No. 1; they were there taken and formed up in the shape of a shackle, ready for the finishers. I mean that the back or body of the shackle blank was straightened, and the ears were thrown to their regular position in the finished shackle.

Q. 10. Please look at the article now handed you, and state what it is; whether it is one of the Beecher Manufacturing Co.'s shackle blanks with the body straightened and the ears bent up.

Ans. I do not know the name given to this part of the shackle by manufacturers, but it is that part that constitutes a shackle aside from the eye, bolt, and nut. It is one of the Beecher Manufacturing Co.'s shackle blanks, with the body straightened and the ears bent up, or thrown into the position in the finished shackle.

(Article referred to introduced in evidence and marked Ex. 5, L. S. B., N. P.)

Q. 11. State whether you understand Exhibit No. 5 was formed up by Beecher Manufacturing Co. in regular course of business, and how it compares with the blanks representing the same stage of the process as observed by you at the works of the defendant.

40 Ans. It was. It is the same form, but whether the same size or not, I cannot say.

Q. 12. Compare Exhibit No. 5 with Exhibit No. 1, as to whether they both represent steps in the process of forming the same sized shackle?

Ans. They do.

Q. 13. What change, if any, in length is caused by transferring the blanks, such as are represented by Exhibit No. 1, into the shape as represented Exhibit No. 5, and give the amount of difference in length?

Ans. That portion of Exhibit No. 1 which is to form the body when straightened and formed up will be shortend $\frac{5}{8}$ of an inch or more, consequently shortening the entire length of the finished shackle the same. I find that to be the case by measuring Exhibit No. 1 (before it is framed up) and Exhibt No. 5 (after it is framed up).

Q. 14. How do you understand that the square corners on the back of Exhibit No. 5 are produced, and give the method from a practical point of view.

Ans. They are formed by throwing out sufficient stock to fill them in the process of forming up.

Q. 15. Suppose there were upon Exhibit No. 1 slight projections like those at *h h* in figure 4 of letters patent to W. B. Smith, which is here shown you, would they be of any practical value in shaping out the corners of the formed-up blank, Exhibit No. 5?

(Question objected to by counsel for defendants, on the ground that the witness is not an expert.)

Ans. I think they would not.

Q. 16. Suppose the blank in figure 4 were not bent or changed in shape from a right line, would the slight projections at *h h* in Figure 4 fill out the corner?

(Objected to by counsel for defendants for the same reason.)

Ans. They would not.

Q. 17. What do you understand to be, mechanically speaking, the substantial reliance for filling out the corners in bending up the blank represented in Figure 4 in the Smith patent?

(Objected to by counsel for defendants for same reason.)

Ans. The extra length of the body furnishing a supply of metal to fill these corners which would necessarily grow scant in the process of forming up.

41 Cross-examined by Hon. O. H. PLATT, of counsel for defendants:

X Q. 18. Was any one present when you received the shackle blank Exhibit 1 from Mr. Beecher, except Mr. Beecher, yourself, and your brother; if so, who?

Ans. I think there was not; I cannot say positively.

X Q. 19. How do you know that Exhibit No. 5 is a shackle made by the defendants, other than concluding it as the result of the measurement you have described?

Ans. In the first place I sent a man there to purchase said Exhibit No. 5; in the second place I find that the form where that part of the clip joins the rod, that it was taken off from as substantially the same form as Exhibit No. 1, which has been placed in evidence, which I understand is peculiar to the Beecher Manufacturing Co.

X Q. 20. Have you had any practical experience in the forming of the blanks like Exhibit No. 1 into a shackle by the bending up process?

Ans. I never have, although I have worked in factories where it has been done, and have known some of the difficulties attending it.

X Q. 21. In what factories have you worked where they form blanks like Exhibit No. 1 by the bending up process?

Ans. In the factory of Julius B. Savage, in Southington, although not exactly at that time of just this particular form, the ears being more of an angle.

X Q. 22. Were the bodies of the blanks used by Mr. Savage angular or curved?

Ans. They were curved at that time.

X Q. 23. And in that respect they differ, did they not, from blank Exhibit No. 1?

Ans. They did.

X Q. 24. You were asked the following questions: "Suppose that blank in figure 4 were not bent or changed in shape from a right line, would the slight projections at *h h* in figure 4 fill out the

corners?" and you answered, "They would not." In the case supposed, how would the blank in figure 4 differ substantially from the blank shown in Exhibit 4?

Ans. As I understand the original question referred to, it referred to a straight blank with the projections *h h* to be
42 placed upon such straight blank at the same points as in figure 4, namely, on the back the same distance apart, and of the same relative sight. The difference would be, there would not be sufficient stock to fill that portion of the back of the shackle that comes rounding when forming up a blank that has no projections, and consequently it would be impossible to make a complete corner.

X Q. 25. The object of the projections on blank Exhibit No. 4 is to furnish stock, to be pushed out in bending, so as to form square corners, is it not?

Ans. It is not the object.

X Q. 26. When blank Exhibit No. 4 is bent and formed, are the corners square or not? In other words, will blank No. 4 make a square-cornered shackle?

Ans. It will, sir, when formed up by the usual process.

X Q. 27. Would it if it were not for the projections?

Ans. It would not.

X Q. 28. Do you understand blank No. 4 to be one similar to blanks used by one or more manufacturers in the making of carriage shackles, and, if so, by whom and how long have such blanks been used?

Ans. I only know of one manufacturer making and using such blanks, and that is H. D. Smith & Co. They have used them for ten or fifteen years.

X Q. 29. What is the object of the projections upon the blank Exhibit No. 4?

Ans. It is to leave sufficient stock to make square corners when the ears are bent up at right angles; or, in other words, when it is formed up to make the size shackle intended.

X Q. 30. In such forming up, is the stock constituting the projections on the blank Exhibit No. 4 displaced or not?

Ans. It is not, materially.

X Q. 31. Is it, or not, upset?

Ans. It is not upset, but is lengthened.

X Q. 32. In the finished shackle, are the corners the same distance from each other as are the projections on the unfinished blank, and if not, what is the difference?

Ans. I find the corners of the shackles about $\frac{3}{8}$ of an inch further apart than the tips of the projections, the tip of each projection having been pushed over to one side in the process of forming up. I speak of the size represented by No. 4.

43 X Q. 33. If the blank shown in Fig. 4 in the Willis Smith patent was in a straight line, and the projections *h h* were in the right place, and large enough, such a blank would make a shackle with square corners, would it not?

Ans. It would if it were materially changed, as I understand the

question to imply, making it the same as the Smith blank, and the corners the same size.

X Q. 34. In forming the blank shown in Fig. 4, the projections *h h* constitute the square corners of the shackle, do they not?

Ans. They do not in my opinion; they only help to form.

X Q. 35. In the specification of that patent obtained by Mr. Shepard, the last witness, I find this language: "It" (referring to the blank) "is then heated, and the oblique portion of the body *g* bent so as to throw the ears *b b* upward in the form shown in Fig. 5, in which operation of bending, the corners *h h* remain unmolested, whereby I am enabled to form the said corners square and full." Do you not understand from the language quoted from the specification that it is claimed therein and thereby that the projections *h h* in the blank constitute the square corners of the shackle when formed?

(Objected to by counsel for complainant, first, because the question calls for the construction of the language of the patent, and second, because the witness professes to speak only as a practical machinist, from a practical standpoint, and third, as implying a construction not required by the language employed.)

Ans. My opinion is that they help, but that the sharp corners *h h* are not the sharp corners in Fig. 5, and consequently do not form the sharp corners in Fig. 5 designated by *h h*, the tendency being in forming up to leave said sharp corners closer together, and would not come far enough out to form said corners in said position in Fig. 5.

X Q. 36. If the blank shown on Fig. 4 of the W. B. Smith patent was in a right line, and had the projections *h h*, would or would not such projections help to fill out or make square corners in the shackle when formed?

Ans. They would make a slight increase of stock at that point, where they would come when formed up, but would have to be increased in size about four times their present size, in order to give stock sufficient to form square corners; for this reason I say they would not fill out and would not make square corners.

44 X Q. 37. Are you interested in this suit?

Ans. I am.

Redirect examination by C. E. MITCHELL, Esq., counsel for complainant:

R. D. Q. 38. Do you know under what patent, if any, the H. D. Smith blank Exhibit No. 4 was originally made and used?

Ans. If you refer to the forming of a square back shackle, I do; patent of James P. Thorp.

R. D. Q. 39. To what did you refer in reply to Cross-int. 32, as the means of finding what you therein state that you find?

Ans. I refer to this shackle which is formed up. (Witness pointing to a formed up shackle back). Article referred to by the witness placed in evidence the same is marked Exhibit No. 6.

R. D. Q. 40. State whether Exhibit No. 6 represents the next step

afrer Exhibit No. 4, for forming an H. D. Smith shackle of the same size?

Ans. It does.

R. D. Q. 41. When you say that the sharp corners *h h* help to give the ultimate corners of the shackle, do you intend to imply that the ultimate corners of the shackle would not be filled out full and sharp if the parts *h h* were left entirely off as they are left off on Exhibit No. 1?

Ans. I did not intend to say they would not be formed if those corners were left off.

R. D. Int. 42. What is your opinion as to the corners on Exhibit No. 5, or blanks like, it being produced from Exhibit No. 1 or blanks like it, solely by the pushing out of the metal in the latter, in the operation of changing its form into the former?

Ans. I have never known of any other method.

Recross-examination by Hon. O. H. PLATT:

Recross int. 43. Describe the process you understand to be referred to by the language in the last question "changing of the form?"

45 Ans. The process I understand is this: taking the heated blank and placing it in a suitable mechanism to form up the ears and straighten the back.

LUCAS C. CLARK.

Subscribed and sworn to before me, this 29th day of December, A. D. 1879.

Attest: LYMAN S. BURR,
Notary Public.

Adjourned to February 7th, 1880.

NEW BRITAIN, CONN., *Feb. 7th*, 1880, 10 A. M.

Present: C. E. Mitchell, Esq., of counsel for complainant, and J. P. Platt, Esq., of counsel for defendants.

JAMES SHEPARD, a witness on the part of complainant, being recalled by the defendants for further cross-examination, and being duly sworn deposes and says:

Re-cross Q. 44. Where did you obtain the exhibit introduced by you and marked "Exhibit Clark Shackle," and "Exhibit Clark's Dies and Blank?"

Ans. They were furnished me by Mr. L. C. Clark.

Re-cross Q. 45. When?

Ans. I can't give the date. The dies I think were furnished since the beginning of this suit; I can't state definitely as to the "Exhibit Clark Shackle," and the blank accompanying the dies.

Re-X Q. 46. Had you ever seen either of the exhibits before they were given to you by Mr. Clark, at the time referred to in your last answer, whenever it was?

Ans. I never saw them until he brought them here.

Re-X Q. 47. Have you any knowledge as to where and how and when they were made, and if so, state?

46 Ans. No positive knowledge, but I supposed they were gotten up by hand, or in the most convenient way at hand, merely to illustrate the dies and blank described in the patent, and to illustrate by the Exhibit Clark Shackle the general form of the finished shackle, as properly formed up from the Clark blank, but it was not intended to be an actual production of said blank, or be proportionally of the same dimensions in all its details.

Re-X Q. 48. Look at the blank in "Exhibit Clark Die and Blank," and tell me if the ears and back and corners are of uniform thickness.

Ans. Substantially so; I have not measured the thickness. By the eye I am unable to discern any substantial difference, that is, supposing the measurement to extend at right angles to the surface of the sides of the blanks.

Re-X Q. 49. If that blank be, as you say, of substantially uniform thickness, with no additional stock at corners, do you know whether or not it is a practical thing to strike it up with a die into a finished shackle with sharp corners, like that represented in "Exhibit Clark Shackle"?

Ans. I do know it is a practical thing to do so, and have seen it done repeatedly.

Re-X Q. 50. When and where?

Ans. In 1871 or thereabouts—I cannot speak very definitely as to time—at the factory of J. B. Savage, at Southington, Conn.

Re-X Q. 51. Have you positive knowledge, at the time you speak of at Savage's factory, there was no additional stock put at the corners?

Ans. There was not enough additional stock at the corners to make any practical difference, measured by the same rule which I have given in measuring the blank Exhibit Clark Die and Blank. It was of uniform thickness throughout its entire length.

Re-X Q. 52. Do you remember the names of the men who worked on the di s in striking up the blanks into shackles at Savage's factory? If so, give them.

Ans. I do not. I had no conversation with any one working on the shackles at the times I have mentioned. I was in the shop to see other parties. I think I have seen Mr. Burdett Smith at that work, but I am not positive.

Re-X Q. 53. Did you look at the dies, so that you can say

47 whether or not a depression was cut in the die for the purpose of furnishing additional stock at or near the corners? And, if so, state what you found to be the fact.

Ans. I made no special examination of the dies.

Re-X Q. 54. Do you know how long they continued to strike up blanks into shackles at Savage's, in the way they were doing it when you were there in 1871?

Ans. No; not personally.

Redirect examination by C. E. MITCHELL, Esq., of counsel for complainant:

Redirect Q. 55. State whether the blanks which you saw at shop of Savage, to which you have alluded, had bent backs, and whether or not, in your judgment, they could have been formed up into the general shape represented by Exhibit Clark Shackle by the means employed for such purpose without such bent-back feature?

Ans. The blanks had curved backs, and in my opinion they could not have been formed up into shackles with square corners like Exhibit Clark Shackle by the means then employed without said curved feature in the back.

JAMES SHEPARD.

Subscribed and sworn to before me, this 7th day of February, A. D. 1880.

Attest: LYMAN S. BURR,
Notary Public.

LUCAS C. CLARK, a witness on the part of the complainant, being recalled by defendants for further cross-examination, and being duly sworn, deposes and says:

Re-X Q. 56. Did you furnish Mr. James Shepard with the Exhibits "Clark's Die and Blank," and "Clark's Shackle," introduced by him in his direct testimony?

Ans. I did.

Re-X Q. 57. Where, when, and how did you obtain them?

48 Ans. I obtained them of H. D. Smith & Co., or the blanks which I changed to this form to illustrate the curved principle in the Clark patent, in the summer of 1879. I went over to H. D. Smith & Co.'s and got them personally. The die blocks were then made to show the general features of a die for the construction of said blank, making them to correspond to the general shape of the blank, sufficiently near to illustrate the principle of the curved depression in the die.

Re-X Q. 58. The curved principle of the Clark patent does not appear in the H. D. Smith & Co. blank, from which you made the Exhibit Clark's Shackle and Clark's Die and Blank, does it?

Ans. It does not, as used by them.

Re-X Q. 59. Does Exhibit No. 4 represent the shape of the H. D. Smith & Co. blank which you used?

Ans. It does not.

Re-X Q. 60. What was the shape of the H. D. Smith & Co. blank which you used?

Ans. I did not use the blank proper, but took one of their shackles already formed up, and bent it into the form as near as I could conveniently to illustrate curved back.

Re-X Q. 61. Was the shackle "already formed up," which you used, similar to Exhibit Clark Shackle?

Ans. Yes, sir; it was.

Re-X Q. 62. Is "Exhibit Clark Shackle" an H. D. Smith & Co. shackle?

Ans. It was one of their make.

Re-X Q. 63. Have you not cut off the ears of the shackle since you obtained it from H. D. Smith & Co.?

Ans. In finishing up the blank, I presume the man who finished the shackle may have changed the length of the ears some.

Re-X Q. 64. Who finished up the shackle and blank?

Ans. Mr. George A. Kilbourne, of Plantsville, did some part of it.

Re-X Q. 65. Were the ears of the shackle cut off at all, out of which the blank shown in Exhibit Clark's Die and Blank was made?

Ans. They probably were some.

Re-X Q. 66. Do you know whether they were or not?

Ans. In changing the form from the H. D. Smith & Co.
49 shackle, we had to heat them and bruise them some, and consequently, when we finished them, it had a tendency to shorten the ears some.

Re-X Q. 67. I infer from your answer that you worked on the shackles in changing them as well as Mr. Kilbourne. Is that so?

Ans. I did.

Re-X Q. 68. Did anybody else work on them besides yourself and Kilbourne; if so, who?

Ans. I could not say positively whether there did or not.

Re-X Q. 69. Did you not have the direction and control of the work of changing the shackles?

Ans. I did.

Re-X Q. 70. Did you not cut down or direct the cutting down of the ears of the shackle now called Exhibit Clark Shackle to a greater extent than the ears of the shackle out of which the blank Exhibit Clark's Die and Blank was made?

Ans. I could not say positively; it is so long since that I don't remember so that I could say positively, and after examining them I cannot say how much they were cut down any more than in finishing.

Re-X Q. 71. Please look at Exhibit Clark Shackle and see if there are not two prick punch marks on each ear, and tell me if they would be necessary in the mere finishing of the shackle?

Ans. They would not necessarily, without a line was struck to finish them in case it were irregular, and did not come perfectly forged.

Re-X Q. 72. Did you do any forging on Exhibit Clark Shackle?

Ans. I merely changed the form. If you call that forging I did; I had to heat them.

Re-X Q. 73. What did you heat them for?

Ans. I misunderstood the last question; I supposed you referred to the blank in connection with Clark's die and blank; I did no forging on "Clark shackle."

R. X Q. 74. Was Exhibit Clark Shackle imperfectly forged when you got it from the factory?

Ans. I could not say.

R. X Q. 75. Does not one of those prick punch marks on each

side represent the center of the circle made by the rim of
50 the ear as it was when you got it; and the other, the center of the circle made by the rim of the ear as it is now?

Ans. It might have been; and it might have been because the first set of punches might not have struck the circle of the ear, and they might have been dropped down so that they could strike the circle. Mr. George Kilbourne could tell in regard to the centers, and also whether I gave directions to have them shortened or not.

R. X Q. 76. Do you find any prick punches on the ears of the blank in "Exhibit Clark's Die and Blank," similar to these you find on the ears of the Exhibit Clark's Shackle?

Ans. I do not; we planed them both down, and one might have been finished before and the other after; I don't remember just how it was.

R. X Q. 77. When you obtained Exhibit Clark Shackle, did it not have H. D. Smith & Co.'s trade mark upon it; and, if so, what has become of it?

Ans. I think it did not, as I got it from the blacksmith shop and it probably would not have been on until it went into the finishing room, but if it had been on, it would have been worked out, as we cracked the back in the process of forming and had to reduce the back considerable to finish it. I now understand that I have misunderstood the question. The exhibit referred to in the question might and might not have had it on, but I had to reduce it to make it correspond to the blank which I have just described under a wrong impression. I mean in reference to thickness, and consequently if the trade mark had been on, it would have been taken out, and the reason we reduced the back of this was because it was necessary to have it correspond somewhere nearly to the blank that goes with it, which we had to reduce, because of being cracked in forming up, as described in the beginning of this answer.

Redirect examination by C. E. MITCHELL, Esq., of counsel for complainant:

R. D. Q. 78. Are you engaged in manufacturing carriage shackles?

Ans. I am not.

51 R. D. Q. 79 Is any manufacturer engaged in making carriage shackles which (in addition to being within the principle of the Clark invention) are so near like the drawings and description of the Clark patent as to be proper for use for illustrative exhibits for the purpose for which Exhibits Clark's Blank and Die and Exhibit Clark Shackle have been used in this case, without being altered somewhat in the details of their shape?

Ans. I could not find them only at the Beecher Manufacturing Co. and J. B. Savage's, at which places it was difficult to obtain them, which blanks, if I could have obtained them, would have been very easy to change for the purpose described in the question.

R. D. Q. 80. In transforming the H. D. Smith shackle for the purpose of illustrative exhibits, were any other changes made than such as were necessary to enable them to be properly labeled Clark shackle and Clark blank?

Ans. No, sir; not to my knowledge. L. C. CLARK.

Subscribed and sworn to before me, this 7th day of February, A. D. 1880.

Attest: LYMAN S. BURR,
Notary Public.

52 United States Circuit Court, District of Connecticut. In Equity.

JAMES B. CLARK *vs.* THE BEECHER MANUFACTURING CO.

Proofs in rebuttal for final hearing taken on the part of complainant in the above-entitled cause, under and pursuant to the sixty-seventh rule in equity, before Lyman S. Burr, Esq., notary public, pursuant to agreement of parties, notice of testimony being waived, and both parties being present by counsel.

NEW BRITAIN, CONN., *September 4th*, 1880—9 a. m.

Present: C. E. Mitchell, Esq., counsel for complainant, and J. P. Platt, Esq., counsel for defendants.

LUCAS C. CLARK, a witness produced on the part of complainant, being duly sworn, deposes and says:

Q. 1. Are you the Lucas C. Clark who has heretofore testified in this case?

Ans. I am.

Q. 2. State whether you have prepared any exhibits to illustrate the effect of striking up the shackle from the shackle blank shown in the drawing in the Clark patent in suit? If so, produce such exhibits and describe the same.

Ans. I have, and now produce them. (Witness here produces two blanks.) The first one is a blank the same shape as the one
53 shown in the Clark patent. The second one is formed up from the first one, showing the result of the process of forming up. I mean formed up from one made in the same die as the first one.

(Blanks produced by witness put in evidence by counsel for complainant, and marked Exhibit No. 7, L. S. B., N. P.)

Q. 3. State how and by whom the second form in Exhibit No. 7 was produced from the first form?

Ans. It was formed up by placing the blank in a bender which bent the ears up, and at the same time a flat die placed in the hammer of the drop was forced down upon the back of the shackle, forming the sharp corners. It was produced by Mr. Edward Pierce and myself.

Q. 4. Is there any practical difficulty in producing blanks like the second form of Exhibit No. 7 from blanks like the first form in Exhibit No. 7, in due course of business?

Ans. There isn't.

Q. 5. State whether the second form has the corners sufficiently sharp for practical use in the manufacture of merchantable shackles.

Ans. It has.

Q. 6. Would there be any difficulty whatever in obtaining sharp

corners from blanks like Defendants' Exhibit Clark's Old Shackle Blank?

Ans. Practically there would be none.

Q. 7. What was the principal method of forming up shackles from blanks in use at the date of the Clark patent?

Ans. In the first place, they were bent up in a hand bender, and then finished in a mandrel, the size the shackle was to be made between the ears, the shackle being placed on this mandrel, and then the two being placed in a griping mechanism which griped the ears firmly against the mandrel, while the back was finished or leveled up with a hammer. Sometimes the mandrel and shackle were given a quarter turn and hammered on the outside surfaces of the ears.

Cross-examined by J. P. PLATT, of counsel for defendant:

X Q. 8. Where and how and by whom was form No. 1 in Exhibit No. 7 made?

Ans. In the factory of the Plant Manufacturing Company.
54 It was made some time between this and the last hearing, I should judge about six weeks ago. It was made by myself, with the assistance of Mr. George Bogue. It was made in a cast-iron die. We made a preliminary blank, similar to the one used by the H. D. Smith Co., the Beecher Co., and Savage, and then placed it in the fire, and heat it to a welding heat, and placed it when so heated in the above-named die, and let the hammer descend upon it, which gave it the form it now has.

X Q. 9. Then the blank from which the second form in Exhibit No. 7 was struck up was precisely similar to the blank which you here exhibit as the first form in Exhibit No. 7, was it not?

Ans. It was practically, both being formed in the same die.

X Q. 10. In the first form in Exhibit No. 7 do you find the ears, corners, and back to be of a uniform thickness?

Ans. Practically so, the back, perhaps, being a trifle thinner, and one ear seems to be a trifle thinner than the other, which variation continues in the bent up blank.

X Q. 11. Don't you find the distance through the metal at the corners in the first form in Exhibit No. 7 greater than in other portions of the blank?

Ans. I do not.

X Q. 12. Is not the second form in Exhibit No. 7 thinner than the first form?

Ans. It is a trifle, but not so much so in proportion to its thickness as the blanks are usually when formed up by the methods now in use.

X Q. 13. In forming up the second form, from the first was it all done by one process?

Ans. Substantially so.

X Q. 14. I mean by that were the ears bent up and the back straightened at the same time, or did it require two separate actions of the dies?

Ans. It was formed up in one and the same former. In order to get it into the former which we had in a very small drop, which was

nearly a sixth lighter than the one usually used by the parties making shackles, and also being so thin, and there being so little room in the drop to manipulate the blank with the tongs, that I bent the ears a little closer together by resting the edge of one
55 ear on an anvil and hitting the other ear with a hand hammer at a corresponding point to where the other ear rested on the anvil, bringing the ears a little closer together at that point, which enabled us more quickly and more easily to place it in the bender which it was desirable to do very quickly, as it was so thin that it cooled very quickly, being much thinner than any ordinary shackle.

X Q. 15. Then form No. 1 is not a correct representation of the blank from which you formed up form No. 2, is it?

Ans. It is a correct representation.

X Q. 16. Form No. 1 has not been placed on an anvil, and one of its ears struck by a hammer, as you have stated the blank from which form No. 2 was struck up was heated, has it?

Ans. It has not, but it would not change the form in No. 2, as No. 2 was struck by the hammer on the anvil, the same as previously described. It would not be necessary to so strike blanks with a hammer, if the drop had been suitable for the business; I was obliged to use such drops as I found in the factory where I was at work, at which place they do not make shackles. The striking with the hammer did not materially change the form of the blank, but made it more easy to place it in the bender or former.

(All of above answer except the first three words objected to by defendants' counsel, as not being responsive to the question.)

X Q. 17. You did, as a matter of fact, strike the ear of a blank which before striking was similar to form No. 1, with a hammer upon the anvil before you put it into the bender, did you not?

Ans. I did, and for the purpose before described, which striking changed the angle a little, but did not bring them up to the position which they have in No. 2, the bender or former having to bring them further up to get them into the position in the finished blank.

X Q. 18. Where did you get the bending dies and drop which you have described in the process?

Ans. The drop was one used by Blakeslee & Co., I got the privilege of putting this bender into it from them.

X Q. 19. Who owns the bender which you use?

Ans. I don't know; that's the question. I have the control of it.

X Q. 20. Can you, and will you, produce and put in evidence that bender?

56 Ans. I will, if so advised by counsel.

(Counsel for respondent asked that the bender or a wooden model of the operative parts be produced, and placed in evidence by the complainant.)

X Q. 21. The die in the bender which you use confines the metal in form No. 1 at the fore part of the body of the blank, so that when

struck up it is impossible for the metal to push forward, does it not?

Ans. It does not confine it so closely that it cannot push forward at all, but limits it.

X Q. 22. Do you mean by that that it limits it equally all over the surface of the metal or that it confines it in such a way that the metal can push out in a thin line around the confining point.

Ans. Upon examination, I find that it is not confined so much as I supposed, half of the surface on one side of the back being not confined at all.

X Q. 23. But the half that comes next to the corners on each side is confined, is it not?

Ans. It is the same as in "Exhibit Bending Dies Bent Blank."

X Q. Are the bending dies and drop used by you in making Exhibit No. 7 like those used by any manufacturer of carriage shackles of whom you have knowledge?

Ans. The bending dies are the same, or substantially the same, as those used by the Atwater Manufacturing Company. The difference in the two being in their bender, it is necessary and essential to form up the blank with the ears at right angles with each other, in order to place the blank in the bending die, where in this bender it is not necessary, their blank being straight. The drop used by me is similar in construction, but of less weight.

X Q. 25. You say that the blank used by the Atwater Company is straight; it is true, is it not, that their blank has no projections or extra metal on it whatever to form the corners?

Ans. Yes, the blank is straight, and no extra stock upon the blank, the extra stock for forming the corners being furnished by an extra length in their blank, which is considerable longer than the finished shackle.

57 X Q. 26. Your bender isn't at all like the Beecher Manufacturing Company's bender, is it?

Ans. It employs the same principle; I consider the two essentially the same in the main features.

Redirect examination by C. E. MITCHELL, counsel for complainant:

R. D. Q. 27. Was the bender used by the defendants, and roughly represented by Exhibit Defendants' Bending Dies, by which the ears are bent up, and the back straightened by a single continuous operation, known or used at the date of the Clark patent?

Ans. It was not.

R. D. Q. 28. Was it known or used by any shackle-maker up to the end of 1871?

Ans. It was not.

R. D. Q. 29. State whether the Atwater Manufacturing Company, to whose blank your attention has been directed, use blanks having a bent back?

Ans. Blanks when they come from the welding die are straight, but are bent so that the back is curved previous to the finishing operation.

R. D. Q. 30. By finishing operation, do you mean the operation that forms the square corners?

A. I do.

R. D. Q. 31. Do they get square corners upon their shackles in regular course of business by straightening this bent back?

Ans. They do.

R. D. Q. 32. Do they have any projection whatsoever on their blank to assist them in getting these sharp corners?

Ans. They do not.

R. D. Q. 33. State whether or not you regard their blanks as within the plaintiff's patent?

(Objected to, because the witness is not an expert.)

Ans. I do.

LUCAS C. CLARK.

Subscribed and sworn to before me, at New Britain, this 4th day of September, A. D. 1880.

LYMAN S. BURR,
Notary Public.

58 JAMES SHEPARD, a witnesss produced on the part of the complaintant, being duly sworn, deposes and says:

Q. 1. Are you the same James Shepard who has heretofore testitified in this case?

Ans. I am.

Q. 2. If you do not agree with Mr. Earle's classification of the methods of forging sharp corners of shackle blanks contained in the answer to question 4 of his deposition, please give reasons and set forth your own views.

Ans. Mr. Earle's statement of the first one of the three methods described is substantially correct. His statement of the second method is substantially correct, although not fully expressed. The novelty of the second method resides in first forming the ears straight while the back is curved, and afterwards forming the shackle by bending the back so as to straighten it. His statement of the third method is misleading, as he mentions only the angles as being formed complete in that process, whereas, in fact, in the process referred to by him, not only the angles, but the entire back of the shackle are first put into their final and complete form, while the ears are curved, which curved ears are subsequently straightened without changing the shape of any portion of the back.

Q. 3. In which of the three methods do you classify defendants' method and blank, giving reasons, and stating also your reasons for excluding it from the other systems.

Ans. It belongs to the second method, because the blank is of sufficient length between the two extreme ears that when they are bent and confined, striking the back to straighten it will upset the metal and force it to the right and left to fill the respective angles, because the ears are first formed straight, while the back is curved and the shackle is formed by bending the back to straighten it.

The defendants' blank and dies do not belong to the first process, because there is no substantial surplus of metal at the point where the angles are to be formed. They do not belong to the third process, because neither the angles or the back are first formed into their complete and final form, and the back is curved instead of being straight, while the ears are straight instead of being curved.

59 The angles at the junction of the ears and back of defendants' blank are not the complete angles which form the sharp corners of the finished shackle, but they are an obtuse angle, and are the substantial equivalent of the round corner.

Q. 4. State if any of the exhibits put in evidence by the defendants enable you to illustrate the way in which straightening the back pushes out the metal to the right and left to form the sharp corners. If so, use them for that purpose.

Ans. They do. "Exhibit Blank for Bending Dies," and "Exhibit Bending Dies Bent Blank" clearly demonstrate that they belong to the second method defined by Mr. Earle. Upon one corner of "Exhibit Bending Dies Bent Blank" quite a prominent fin is formed, showing conclusively that metal has been forced out from the back towards that corner. I also find by exact measurement that "Exhibit Bending Dies Bent Blank" is just one-eighth of an inch less in length than is Exhibit Blank for Bending Dies, showing clearly that if this shackle "Exhibit Bending Dies Bent Blank" was formed from a blank like "Exhibit Blank Bending Dies" which I understand to be the fact), the metal was upset, the entire thickness of the blank for an eighth of an inch of its length and forced to the right and left to fill out the corners. I also find by measuring upon the surface of the blank between the prick punch mark that they are one-quarter of an inch farther apart upon the bent blank or shackle than they are upon the blank for bending, showing that they have been forced apart in the process of bending. The surface between them is flat and smooth, thereby showing conclusively that the metal in the back has been forced to the right and left to fill up all deficiencies caused by bending and leave a straight back with full sharp corners.

Q. 5. State whether or not you regard this forcing of the metal to the right and left resulting in the full sharp corners, as the operation expressed in the patent by the language "the straightening of the body of the shackle, pushing out sufficient material for forming the sharp corners without having any hindersome and impracticable projections."

Ans. I do.

Q. 6. Mr. Earle stated that in his opinion defendant "Exhibit Savages modified Clark's Blank" is within the Smith patent, under which defendants' blank is claimed to be made; will you state whether or not in your opinion it is within the Clark patent in suit, giving reasons?

60 Ans. It is; because the back is curved while the ears are straight.

Q. 7. Is there any more reason why the bent back of "Exhibit Savage's last modification of Clark's Blank," should be regarded as

the equivalent of the two obtuse angles of the Smith blank used by the Beecher Company, which does not equally establish the equivalency of the obtuse angle corner of the Smith blank, and the rounded corner of the Clark blank?

Ans. There is not; I agree with Mr. Earle in the opinion that the curved back of "Exhibit Savage's last modification of Clark's Blank," is the equivalent of the obtuse angled back shown in the Smith patent of defendants. The same reasoning would make the obtuse angled corners of defendants' blank the full equivalent of the rounded corners of the Clark blank.

Q. 8. Mr. Earle states in reply to question 14, of his deposition, that in his opinion, complainant's patent does not admit of the thickening of the blank at or near the point where the corner of the shackle will be to aid the formation of the angle. State whether or not you agree with Mr. Earle, giving reasons for your views.

Ans. I do not agree with him; because there is nothing in the patent which restricts it to a blank having no thickening of the blank at or near the point where the corners are to be formed. The patent, however, does refer to hindersome or impracticable projections as something to be avoided. This language of the patent evidently refers to the shackle made under the Thorp patent like "Exhibit No. 4," which projections extend in part from the ears of the shackle, and project quite prominently beyond the outside surface of the ears. The blank shown and described in the Clark patent, may be thickened at the point where the angles are to be formed, without having any portion of the metal project beyond the outside surface of the ears. Consequently such an enlargement of the metal would not form hindersome and impracticable projections. As I understand the Clark patent, the blank may be thickened at the points where the angle is to be formed in such a way as to assist in forming full and sharp corners, and if the back is curved, while the ears are straight, such blank would still be within the Clark patent. Only such projections and enlargements as are
61 objectionable, and such as are formed upon a straight blank are excluded by limitation from the Clark patent.

Q. 9. Please read Mr. Earle's reply to question 19, in which he appears to contradict the testimony of Mr. Lucas C. Clark, which is quoted in said question, and say whether, in your opinion, Mr. Earle does in fact contradict Mr. Clark, giving your reasons.

Ans. He does not, taking the answer as a whole, because he qualifies his first statement as to what shortening means, and afterwards gives only the outside measurement, and does not attempt to contradict Mr. Clark as to his statement as to average measurement. In Mr. Earle's qualification of what is meant by shortening, I do not understand him to deny Mr. Clark in his statement that the blank is shortened; he only denies that the result claimed by Mr. Clark in shortening does occur. In this respect I think Mr. Earle is mistaken.

Q. 10. Please state whether you agree with Mr. Earle in his comparison with drawings 4 and 5 of the Smith patent.

Ans. I agree with him substantially in his measurement, so far as

he gives them, but do not agree with him in the results stated, because he has given only a part of the measurements which are necessary to determine the question propounded to him.

Q. 11. State whether you agree with Mr. Earle's reply to question 21 of his deposition, where he says that "Exhibit No. 1 enables the complete forming of the corners before bending," and that such corners "remain unmolested in the operation of bending."

Ans. If by corners, Mr. Earle means the sharp corners which are necessary in the finished shackle, then I entirely disagree with him. The obtuse angles in Exhibit No. 1 are no more the sharp corners specified in the patent as necessary to the finished shackle than are the obtuse angles on Exhibit Old Style Shackle on each side of the flat portion of the back, and they do not remain unmolested in the operation of bending, but that operation as practiced in the dies represented in Defendants' Exhibits bending dies molests them, and transforms them into the required sharp corners, in precisely the same way as the equivalent bends in the Clark blank are
62 molested and transformed into sharp corners when the Clark blank is bent up into shape.

JAMES SHEPARD.

Subscribed and sworn to before me, at New Britain, this 4th day of September, A. D. 1880.

LYMAN S. BURR,
Notary Public.

63 And on the 25th day of November, 1880, defendant's evidence was filed in the words and figures following, viz:

64 United States Circuit Court, District of Connecticut. In Equity.

JAMES B. CLARK *vs.* THE BEECHER MANUFACTURING COMPANY.

Proofs for final hearing taken on the part of the defendants in the above-entitled cause, made under and pursuant to the 67th rule in equity, before C. H. Shaw, Esq., notary public, pursuant to agreement of parties, notice of testimony being waived.

MERIDEN CONN, *June 26th*, 1880—9 o'clock a. m.

Present: O. H. Platt, Esq., counsel for defendant, and Charles E. Mitchell, counsel for complainant.

JOHN E. EARLE, a witness produced on the part of defendant, being duly sworn, deposes and says, in answer to the interrogatories propounded by O. H. PLATT, Esq., as follows:

Ques. 1. What is your name, age, residence, and occupation?

Ans. 1. John E. Earle; forty-nine years of age; reside in New Haven, Conn.; am a solicitor of patents, and a large portion of my time as expert in patent causes.

Ques. 2. What has been your experience in connection with patents and mechanical operations and manufactures?

65 Ans. 2. For nearly thirty years past I have been engaged in procuring patents; during the past ten years of that time I was largely employed as mechanical draughtsman, preparing drawings for the construction of various kinds of machines and other mechanical structures, generally from the crude ideas of the inventor or builder, and in many cases superintended the construction and worked practically upon them. During the past eighteen years I have been engaged exclusively in connection with patents, and during that time have prepared more than five thousand applications for patents in this and foreign countries, all of which required more or less examination and comparison with previous patents or constructions, and frequently a careful examination into the process of manufacture and mechanical devices employed therein. I have, during the past twenty years, been many times called upon to examine into the state of the arts bearing upon patents or patented devices for the purpose of ascertaining the validity and scope of such patents preparatory to prosecution or defense under such patents. During the past fifteen years I have been many times called upon to testify as a mechanical expert in patent causes.

Ques. 3. What experience, if any, have you had in the art of forging metals or forging articles from iron or steel?

Ans. 3. In preparing drawings for mechanical devices it falls upon the draughtsman to prepare the details for the work so that they may be constructed with the greatest facility. Hence it was necessary for me to, and I did, give early attention to the best methods of forging or shaping the various parts of machinery
66 or mechanical devices for which I was required to make drawings. During the past twenty years I have been especially familiar with forging articles of carriage hardware. Have procured a large number of patents for such articles of carriage hardware and the mechanical devices for forging the same. In many cases I have observed and become familiar with the practical operation of forging devices. It is from this experience that I have become familiar with the forging of articles of iron or steel.

Ques. 4. Have you read and do you understand letters patent No. 66130, granted James B. Clark, dated June 25, 1867? If yes, state what you understand to be the invention therein described and particularly recited in the claims.

Ans. 4. I am familiar with that patent. Have been several times called upon to examine it in reference to its scope, and believe I understand the invention therein described and claimed. The invention is for an improvement in the manufacture of the article known to the trade as "carriage shackles" or "thill couplings;" that is to say, in the device by which the pole or thills of a carriage are hinged to the axle. The invention relates particularly to that class of shackles which consists of a horizontal plate with a pair of vertical ears rising therefrom, between which the eye of the thill iron is hinged. The flat or body part of the article is forged with a projection at each side, forming what is commonly called the "clip," by which the article is secured to the axle. The ears

are bent at right angles to the back or body portion. In the process of forging articles in which a right angle is to be formed, as between the ears and the back of the shackle, one of three things is requisite to the perfect formation of the angle. If the ears
67 be simply bent from the body into a right angle thereto, as seen in Exhibit "Old Style Shackle," the outer corners will be rounded because of such bend, but which for a carriage shackle is an unsalable shape. The three processes by which the corners can be made a sharp angle are, 1st, to prepare the blank with a surplus or projection of metal at those points—that is, where the angles are to be formed—so that when the bending takes place that surplus of metal will fill the corners to a sharp and clearly defined right angle; 2nd, to make the blank of sufficient length between the two extreme ends, and bend it so that the ends of the ears or blank, being confined, the portion between them, when struck, will be upset and forced to the right and left to fill the respective angles; 3d, to form the angles complete, or substantially so—that is, to clearly define it before the bending into shape occurs.

In the patent of Clark referred to in the question, the method purporting to be employed is that of the second process, which I have above described. The dies by which the blank from which a shackle is to be produced are in two parts. In one is a cavity or cavities corresponding to the shape of one side of the blank to be produced, and the other shaped to correspond to the other side of the blank and close upon the other side of the die. The blank thus produced has what is called a curved-shaped body—that is, the central part of the blank is bent into a segment shape, and the ends of the blank are bent obliquely, and so as to form a rounded shape between the oblique portions and the central curved body, both inside and out the curve of these rounded portions being the reverse of the curve of the central portion. For illustration of this
68 shape reference is made to the drawing, and in which Fig. 1 defines it. This figure represents a transverse section through the two parts of the die, and the part of the blank which is to form the ears and body. When the two extremes of the blank thus formed are bent up at right angles, they will show rounded corners. Now, if the body be straightened while the ears are held, the surplus metal due to the bend is intended to be forced to the right and left, and fill out those rounded corners to a complete right angle. This operation upon the body is what is termed upsetting. The specification thus defines the blank, and the operation of finally shaping it, which I have last described: "The portion of the blank where the arms" (that is to say, the extremities, which are finally to form the ears) "join the body is rounded, as shown on both the inside as well as on the outside, the straightening of the body of the shackle pushing out sufficient material for forming the sharp corners, without having any hindersome and impractical projection." The impractical projections referred to I understand to be the projections as employed in the first method of forming angles in forging. I understand the invention recited in the first claim to be for this peculiarly shaped bent body and the reverse rounded portions

65 Ans. 2. For nearly thirty years past I have been engaged in procuring patents; during the past ten years of that time I was largely employed as mechanical draughtsman, preparing drawings for the construction of various kinds of machines and other mechanical structures, generally from the crude ideas of the inventor or builder, and in many cases superintended the construction and worked practically upon them. During the past eighteen years I have been engaged exclusively in connection with patents, and during that time have prepared more than five thousand applications for patents in this and foreign countries, all of which required more or less examination and comparison with previous patents or constructions, and frequently a careful examination into the process of manufacture and mechanical devices employed therein. I have, during the past twenty years, been many times called upon to examine into the state of the arts bearing upon patents or patented devices for the purpose of ascertaining the validity and scope of such patents preparatory to prosecution or defense under such patents. During the past fifteen years I have been many times called upon to testify as a mechanical expert in patent causes.

Ques. 3. What experience, if any, have you had in the art of forging metals or forging articles from iron or steel?

Ans. 3. In preparing drawings for mechanical devices it falls upon the draughtsman to prepare the details for the work so that they may be constructed with the greatest facility. Hence it was necessary for me to, and I did, give early attention to the best methods of forging or shaping the various parts of machinery
66 or mechanical devices for which I was required to make drawings. During the past twenty years I have been especially familiar with forging articles of carriage hardware. Have procured a large number of patents for such articles of carriage hardware and the mechanical devices for forging the same. In many cases I have observed and become familiar with the practical operation of forging devices. It is from this experience that I have become familiar with the forging of articles of iron or steel.

Ques. 4. Have you read and do you understand letters patent No. 66130, granted James B. Clark, dated June 25, 1867? If yes, state what you understand to be the invention therein described and particularly recited in the claims.

Ans. 4. I am familiar with that patent. Have been several times called upon to examine it in reference to its scope, and believe I understand the invention therein described and claimed. The invention is for an improvement in the manufacture of the article known to the trade as "carriage shackles" or "thill couplings;" that is to say, in the device by which the pole or thills of a carriage are hinged to the axle. The invention relates particularly to that class of shackles which consists of a horizontal plate with a pair of vertical ears rising therefrom, between which the eye of the thill iron is hinged. The flat or body part of the article is forged with a projection at each side, forming what is commonly called the "clip," by which the article is secured to the axle. The ears

are bent at right angles to the back or body portion. In the process of forging articles in which a right angle is to be formed, as between the ears and the back of the shackle, one of three things is requisite to the perfect formation of the angle. If the ears
67 be simply bent from the body into a right angle thereto, as seen in Exhibit "Old Style Shackle," the outer corners will be rounded because of such bend, but which for a carriage shackle is an unsalable shape. The three processes by which the corners can be made a sharp angle are, 1st, to prepare the blank with a surplus or projection of metal at those points—that is, where the angles are to be formed—so that when the bending takes place that surplus of metal will fill the corners to a sharp and clearly defined right angle; 2nd, to make the blank of sufficient length between the two extreme ends, and bend it so that the ends of the ears or blank, being confined, the portion between them, when struck, will be upset and forced to the right and left to fill the respective angles; 3d, to form the angles complete, or substantially so—that is, to clearly define it before the bending into shape occurs.

In the patent of Clark referred to in the question, the method purporting to be employed is that of the second process, which I have above described. The dies by which the blank from which a shackle is to be produced are in two parts. In one is a cavity or cavities corresponding to the shape of one side of the blank to be produced, and the other shaped to correspond to the other side of the blank and close upon the other side of the die. The blank thus produced has what is called a curved-shaped body—that is, the central part of the blank is bent into a segment shape, and the ends of the blank are bent obliquely, and so as to form a rounded shape between the oblique portions and the central curved body, both inside and out the curve of these rounded portions being the reverse of the curve of the central portion. For illustration of this
68 shape reference is made to the drawing, and in which Fig. 1 defines it. This figure represents a transverse section through the two parts of the die, and the part of the blank which is to form the ears and body. When the two extremes of the blank thus formed are bent up at right angles, they will show rounded corners. Now, if the body be straightened while the ears are held, the surplus metal due to the bend is intended to be forced to the right and left, and fill out those rounded corners to a complete right angle. This operation upon the body is what is termed upsetting. The specification thus defines the blank, and the operation of finally shaping it, which I have last described: "The portion of the blank where the arms" (that is to say, the extremities, which are finally to form the ears) "join the body is rounded, as shown on both the inside as well as on the outside, the straightening of the body of the shackle pushing out sufficient material for forming the sharp corners, without having any hindersome and impractical projection." The impractical projections referred to I understand to be the projections as employed in the first method of forming angles in forging. I understand the invention recited in the first claim to be for this peculiarly shaped bent body and the reverse rounded portions

between the body and the extremities. The second claim is for the dies A B, for making the same blank, that is, giving to it or forming the rounded corners and curved body. There is no description of the dies other than that embraced in the words which follow the description of the blank, as follows: "The dies are formed so as to
give the blank the required shape. The direction, therefore,
69 from this description is the form of the blank given make the
dies of the corresponding shape in the usual and well-known manner for making dies for forging other articles of known shape."

Ques. 5. Are you familiar with the process of manufacturing carriage shackles practised by the defendant?

Ans. 5. I am.

Ques. 6. Have you examined "Exhibit No. 1, L. S. B.," and "Exhibit No. 5, L. S. B.," introduced by the complainants in evidence, representing carriage shackle blank and carriage shackle made by the defendants; and, if so, state whether, in your opinion, those exhibits infringe complainant's letters patent or not, giving the reasons for your opinion?

Ans. 6. I have examined exhibits referred to. Exhibit No. 1 is a blank from which could be made substantially a shackle like Exhibit No. 5. This blank does not infringe complainant's patent, because: 1st. It is forged by a totally different process, and is that which I have described as the third method in forming angles in forging. In this blank, Exhibit 1, the angles or corners of the ears are completely and perfectly defined in the blank, and so that when bent the shape at the angle, so far as the ear is concerned, is unchanged, and there is no corner or angle to be filled by upsetting or otherwise. 2d. It has not the rounded corners of the complainant's patent, neither has it the intermediate curved body, both of which are an essential feature in the complainant's patent, in order that the angle or corner may be made right or sharp.

The dies by which this blank Exhibit No. 1 was formed cannot
infringe the claim to the dies in complainant's patent, because
70 the article produced being different, the dies which produce it
must be different.

I take into consideration the fact that the specification says: "The dies are formed so as to give to the blank the required shape." It is true this description would apply to the dies from which Exhibit No. 1 is formed, and so it would with precisely the same force to the various shaped dies for forging carriage shackles, known and used long prior to complainant's patent. A further difference between the blank Exhibit No. 1 and the dies which formed it and the blank and dies in complainant's patent is, that in order to form the rounded corners or portions "where the arms join the body, * * * on both the inside as well as on the outside," necessitates the bending of the arm or ear portions obliquely, because if the rounded portions were preserved, and the arms made horizontal and in the same plane, then the blank would have what the specification terms "hindersome and impractical projections."

The arms or ears in blank Exhibit No. 1 are in the same horizontal plane, and consequently have not the rounded corners. As to Ex-

hibit No. 5, the complete shackle is not shown in the patent. In coming to this conclusion regarding the blank, I take into consideration the fact that the ears in Exhibit No. 1 are not in the same plane with the back or body, but are parallel therewith, and has an oblique portion between each of the ears and the body. But this does not correspond to any quality in the shape of complainant's blank. The length of the straight body portion on what is to be the inside measures just what the finished tackle will measure between the ears, to wit, one inch and one-half. There is, therefore, no metal in the body or straight portion to be moved at all, as in complainant's
71 patent, because there is no occasion for it. When the ears are turned up, that portion between the angle of the ears and the body is not forced out or moved to fill those angles, because they are already completely and perfectly defined. The metal, therefore, between the ends of the body is simply used to fill the inner angle, and in no sense to change or affect the shape of the angle of the ears, which was previously formed. This peculiar shape of the Exhibit No. 1 cannot be the same as that required by complainant's patent, nor is it an equivalent for the same, because there is no operation required on Exhibit No. 1 to form a shackle analogous to or equivalent for the operation performed in complainant's by the curved back and rounded adjacent portions.

Ques. 7. Assuming that the blank shown in complainant's patent can be forged so as to produce a shackle having full and sharp corners, how much of the metal of which such blank is composed must be upset or displaced in the operation?

Ans. 7. So much as will make the rounded portions into a right angle upon the out and in side.

Ques. 8. In forging Exhibit No. 1 so as to form a shackle with full, sharp corners, what portion of the metal composing the blank will be upset?

Ans. 8. There is no upsetting to form the angles; the metal simply changes its position so as to extend the back and give the required length between the two formed angles.

Ques. 9. Describe the process by which the defendant's forge blanks like Exhibit No. 1 into the shape or form substantially shown in Exhibit No. 5.

Ans. 9. The die for turning up the ears, or bringing the
72 blank to the shape seen in Exhibit No. 5, is illustrated in defendant's bending dies. This consists of two cheeks hinged to a base, so that when turned into the same plane with each other there is a space between them corresponding substantially to the space required between the ears of the shackle. In each of these cheeks is a cavity corresponding to the shape of the ears of the blank, that is, the part from the angle to the end; that part which corresponds to the angle when the dies are closed stands on the base. These cheeks, with their base, are made fast to the angle, and on the hammer is a follower corresponding to the space between the dies enclosed, less the thickness of the back. The operation is as follows: The hammer or follower is raised, the two cheeks are turned outwardly upon their hinges until so far open that the blank may be

introduced and the extreme end of the ears may be placed one in the cavity of one cheek, and the other in the cavity of the other; the outside of the ears downward, so as to present the inside of the back or body at the center. Then the follower is thrown down and strikes upon the back, forcing it downward, causing the cheeks to close and turn the ears up into substantially a right angle from the back. I have present a blank forged to the size corresponding to the Exhibit Bending Dies, and which is marked Defendant's "Exhibit Blank for Bending Dies." I also present the blank as bent in dies, corresponding to "Exhibit Bending Dies," and which is marked Defendant's "Exhibit Bending Dies Bent Blank."

(Counsel for defendant offers in evidence the articles above referred to and marked correspondingly.)

73 Ques. 10. I observe upon the angles of "Exhibit Blank for Bending Dies" marks apparently made by a prick punch, also similar marks upon the angles of "Exhibit Bending Dies Bent Blank." State, if you know, how those marks came there, and for what purpose they were made, and whether you are enabled from their positions upon the respective exhibits to draw any conclusions; and, if so, what.

Ans. 10. Those marks were made with a prick punch, and under my directions. The two blanks were forged in my presence by the workman who was then engaged in producing those blanks in defendant's shop. I caused a prick punch to be made at the angle of the ears alike on the two blanks. I then caused one of the blanks to be reheated and then struck in the bending dies. The blank so struck is the blank Defendant's "Exhibit Bending Dies Bent Blank." The other I preserved without bending, and that one is Defendant's "Exhibit Blank for Bending Dies." The object I had in doing this was to illustrate the fact that the angle of the ears was clearly defined and determined before the bending operation takes place, and that there is no metal forced or upset to fill that angle. The result of the operation was that the portion of the prick punch depressions which is above the angle on the blank was unchanged in the process of bending, thus showing that no metal is "pushed" out to form the sharp corners, because, had the metal been so pushed or forced outward, the prick punch marks would have disappeared.

Ques. 11. Referring to the blank shown in the specifications and drawings of complainant's patent, and supposing a prick punch
74 mark to have been placed upon the center of the rounded portions of the outside of the blank, and the blank to then have been struck into shape so that the corners would be full and sharp, would the prick punch marks, in your opinion, be visible thereon?

Ans. 11. They would not, because the upsetting of the metal would destroy the mark; unlike defendant's blank, the part of the blank where the marks are supposed to be made is changed and entirely reshaped, and it would fill the depressions made by the punch as it fills the angles.

Ques. 12. Do you, or not, understand that complainant's patent

required the blank therein referred so to be of uniform thickness when viewed on the edge?

Ans. 12. No, sir; I do not. All that I find in the specification relating to the thickness is in the following words: "This process of forming shackle blanks * * * forms each part of the shackle with just the required amount and thickness of metal for completing the article;" but I do not understand this to claim any special advantage for this invention, for the reason that precisely the same description applies to the blanks made long prior to defendant's patent. It is a fact, however, that the drawing shows the blank of equal thickness from end to end.

Ques. 13. In your opinion is it practicable to form a blank such as is described in complainant's patent, and shown in his drawing, into a shackle which will have full and square corners, by any known process of drop forging?

Ans. 13. I do not think a blank having the extensive rounded portion shown in complainant's patent could be forged practically into a sharp and clearly defined corner, for the reason that the bar heated is first placed in the dies to give the shape to the blank; as for illustration I refer to exhibit marked "Defendant's Exhibit Untrimmed Blank." It is then usually struck twice at least; it is then placed in the trimming dies, and the fin or surplus metal cut away, leaving the blank in the shape seen in the "Exhibit Blank for Bending Dies." It is then transferred to the dies which turn up the ears. With a blank like that shown in complainant's patent, the two first operations would have so far cooled or chilled the blank that the upsetting of the metal to completely fill and form the angle could not take place. Whether or not a reheating between the second and third operations would completely shape the blank, I am not prepared to state.

75

Ques. 14. Does the complainant's patent admit of the thickening of the blank, at or near the point where the corner of the shackle will be, to aid the formation of the angle?

Ans. 14. No, sir; on the contrary, the patent explicitly states the contrary when saying that the blank is without "any hindersome or impractical projections." Such thickening at the point where the angle was to be formed was well known long prior to complainant's patent, and is what I have referred to as the first process for forming sharp angles or corners.

Ques. 15. If, then, depressions were cut in the dies shown in the Clark patent at the point which forms the rounded portion so that that portion would be no longer rounded, or that there would be an accumulation of stock at that point, would such dies and the blanks formed therein be within the patent?

Ans. 15. If there be such a cavity or enlargement of the cavity in the die as to leave sufficient metal at the point where it is required to form the angle as to fill the angle, then it would not be a Clark patent, because such an accumulation of metal is just what the inventor says he avoids; and, further, it would be substantially what had been done long prior to his invention.

76

Ques. 16. Compare Complainant's "Exhibit No. 1, L. S. B." with "Exhibit No. 5, L. S. B.," and state whether "Exhibit No. 5" was struck from a blank like "Exhibit No. 1"?

No, sir; it was not. The shape of the ears is very different, which shows conclusively that "Exhibit No. 5" could not have been made from a blank like "Exhibit No. 1."

Ques. 17. Are you familiar with the process and art of forming carriage shackle blanks and shackles as the same has been practised during the last twenty years; if so, describe the same?

Ans. 17. Prior to 1860 shackles were usually made with the ears bent up so as to leave a rounded corner, as seen in "Exhibit Old Style Shackle." In 1860 J. P. Thorp procured a patent for filling out these rounded corners and making them sharp and clearly defined. The date of the patent was May 1st, 1860, No. 28114. The invention consisted in thickening up or making a projection at the point where the angle was to be formed, so that the surplus metal thus added would fill out the previously rounded corner and make it a complete right angle. The Thorp patent was reissued Sept. 18, 1866, No. 2362, a certified copy of which I here produce, and is marked Defendant's "Exhibit Thorp Patent." The process of the Thorp patent is that which I have described as the first process.

77 Later I find L. Burns' patent of June 11, 1867, No. 65641. In this patent a blank is formed so as to shape and determine the angle of the ears before the ears are turned up. In the blank the ears are in the same plane with each other and in a plane parallel to the back, and so that in bending up the ears the previously formed angle is unchanged. This patent in Fig. 7 shows a section of the die and blank through the ears and body relatively the same as the section in Fig. 1 of complainant's patent. The process of the Burns patent is what I have described as the third process. I here present a copy of the said patent, and it is marked Defendant's "Exhibit Burns Patent." These two patents, together with complainant's patent, exhibit the three different processes as practiced or introduced since 1860.

Ques. 18. How do the dies shown in the Burns patent and the Thorp patent compare with the dies shown in complainants' patent? Describe resemblance and difference, if any.

Ans. The description of the dies in the Clark patent, which is in the following words: "The dies are formed so as to give to the blank the required shape," applies equally as well and equally clearly describes the dies in both the Thorp and Burns patent. They are formed in precisely that way, that is to say, the peculiar shape of the blank is determined and the dies are formed of corresponding shape and "so as to give to the blank the required shape." The blanks are different in the particulars defined in my last answer. The only difference between the dies is that each is found "to give to the blank the required shape." The dies of the Burns patent form each

78 part of the shackle with just required amount and thickness of metal for completing the article. So also do the dies of the Thorp patent, because after the blank is shaped no metal is added, and the only change made in the metal is in working the sur-

plus into the angles, which is also the change which is made in the Clark patent.

Ques. 19. In the testimony of Lucas C. Clark, one of complainant's witnesses, I find the following question and answer:

"Q. What change, if any, in length is caused by transforming the blanks such as are represented by 'Exhibit No. 1' into the shape as represented by 'Exhibit No. 5,' and give the amount of difference in length?"

"A. That portion of Exhibit No. 1 which is to form the body when straightened and formed up will be shortened five-eights of an inch or more, consequently shortening the entire length of the finished shackle the same. I find that to be the case by measuring 'Exhibit No. 1' before it is formed up, and 'Exhibit No. 5' after it is formed up."

Will you please measure the two exhibits referred to in said question and state whether you find the shortening of the blank in forming up referred to by the witness?

Ans. 19. There is no shortening whatever of the blank, presuming that shortening means or is intended to imply an upsetting which may occur to in some degree aid in the shaping of the angle.

The blank "Exhibit No. 1" is not like the blank from which "Exhibit No. 5" was made. Measuing blank No. 1 upon the outside, I find it measures $5\frac{5}{16}$ inches; measuring the blank "Exhibit
79 No. 5," I find its outside measurement is $5\frac{11}{16}$ inches, therefore, instead of shortening, the blank No. 5 is longer than blank No. 1, outside measurement.

Ques. 20. Look at drawings 4 and 5 of the letters patent to W. B. Smith, Complainant's "Exhibit No. 3," and make the same comparative measurements between Figs. 4 and 5, for the purpose of showing whether such drawings represent the blank to have been shortened in the forming-up process.

Ans. 20. The drawings in the patent referred to show a blank with the angle formed previous to bending, and is that class of forging found in the Burns patent, and as practised by the defendants. The total outside measurement of blank Fig. 4 is $2\frac{5}{16}$ inches, measuring outside of the same blank with the ears bent up in Fig. 5, it measures $3\frac{3}{16}$, an increase or lengthening of $\frac{7}{16}$, and consequently not a shortening up.

Ques. 21. Please examine Complainant's "Exhibit No. 3," letters patent issued to W. B. Smith, and compare blank "Exhibit No. 1" with said letters patent, and state whether said blank does or does not embrace the invention described in the said letters patent and shown in drawing Fig. 4.

Ans. 21. I have made the comparison, and find that "Exhibit No. 1" is in accordance with the Smith patent referred to. I take into consideration the fact that in the patent the corners are shown at right angles, while in the blank No. 1 they are an obtuse angle; but this I do not understand to be an essential difference, for all the advantages claimed by the patent exist in this blank Exhibit 1, to wit, that it enables the complete forming of the corners before bending. They remain unmolested in the operation of bending, and the same

advantages as to trimming exist as described in the patent.

80 Ques. 22. Please look at the blank which I now hand you, to be marked defendant's "Exhibit Savage's Modified Clark Blank," and say whether such exhibit is in accordance with complainant's patent?

Ans. 22. I have examined the blank, and am of the opinion that it is within the Smith patent No. 106,225, for the reason that the outside surface and angles of the ears is completely formed and shaped, and the material which is to form the body or back is bent upward from the inside of the ears, and so that the same shape which the ears have in the blank would be preserved in bending up. It is true the two ears are not in the same plane, but approach so nearly thereto as not to make it materially different from the patent. I misunderstood the question, and understood it to refer to the Smith patent. It is not within the complainant's Clark's patent, for the reasons which I have before given regarding the formation of the angles. The angles are complete in this exhibit, and in complainant's patent the angles are yet to be formed.

(Blank referred to in the above question and answer offered in evidence, marked "Savage's Modified Clark Blank.")

Cross-examination by C. E. MITCHELL, counsel for complainant:

X Ques. 23. The Burns patent shows a blank having right angles, does it not, before the operation of bending?

Ans. 23. Very nearly, as near a right angle as the intersection of a radial line with the circumference of a circle can make.

81 X Ques. 24. In the specification of the Burns patent I find this language: "These dies upon their two faces in contact with each other, are so cut out as to impart or to throw up the said blank or coupling arms into square corners, L, as thown in Fig. 1, so that if then bent up at right angles to form the eye desired, perfect square corners will be left, with the metal through such corners and the other portions of the eye of a uniform thickness, these arms being bent up in a direction toward each other." Do you recognize this description as making the angles right angles in the blank before bending up?

Ans. 24. Yes, sir; as near a right angle as the intersection of a radial line with the circumference of a circle can make.

X Ques. 25. Do you find anything in the patent or drawing of the patent, which is not consistent with the angles being right angles bounded for an appreciable distance with a straight line?

Ans. 25. There is no straight line on one side of the line, because it is a circle or a part of a circle, and in a circle there is no straight line. Hence, when I say that it is substantially a right angle, it is only a right angle to the extent I have mentioned.

X Ques. 26. Recurring to your statement of the three processes by which a sharp angle may be made, contained in your reply to Question 4, please say if Exhibit No. 4 exemplifies the process first named.

Ans. 26. Yes.

X Ques. 27. And the plaintiff's blank exemplifies the second
82 process, and the blank of the Burns patent exemplifies the third process?

Ans. 27. Yes.

X Ques. 28. If I am right, the first process, as exhibited in Exhibit 4, produces a blank straight throughout its whole extent on one side, and correspondingly shaped on the other side, excepting where the projections are found?

Ans. 28. Yes.

X Ques. 29. And the second process, as exemplified in the Clark patent, is characterized by a bent back, and substantially straight portions to be formed into ears?

Ans. 29. No, sir; it is characterized by a bent back with straight portions (oblique) to be bent into shape for the ears, combined with a rounded portion between each end of the bent body and the said oblique portion.

X Ques. 30. Then it has, as I understand you, "straight portions to be bent into shape for the ears," and also a bent back, whatever else may be true?

Ans. 30. These are two essentials, but no more so than the intermediate rounded portions.

X Ques. 31. And the Burns blank has a straight back with bent portions to be formed up into ears, has it not?

Ans. 31. It has a straight back, with straight portions terminating in a curve at the angle of the back, that curve to be straightened by turning up the ears; but no part of them can be understood as bent portions in the sense in which I have used that term.

X Ques. 32. The only bend in the Burns blank is in the ears, is it not?

Ans. 32. Yes; just outside the angle.

83 X Ques. 33. If, then, the portion between the ears of defendant's blank is to be regarded as the equivalent of a curve —I mean the portion that is to form the back—it is like the Clark back, and not like the Burns back; that is so, is it not?

Ans. 33. No, sir; because the curve in the Clark patent consists necessarily of the central bend with a reversed curve at each end, and a simple U-shaped bend cannot be an equivalent to those three bends, because the U-shaped bend necessarily involves the angle at the lower end of the ears; with the Clark bend it requires those angles to be subsequently formed.

X Ques. 34. Suppose, as I intended to imply before, that the back of defendant's blank is the equivalent of the curve of the body of the Clark blank, between the rounded portion where the arms join the body, is not the defendant's blank like the plaintiff's blank, as to its back, and not like the Burn back?

Ans. 34. No, sir; it is not a supposable case, because it is impossible to have the curved back of the Clark patent without the rounded portions; they cannot be separated, as they are a part of the back and ears to be formed; whereas in the defendant's blank the bent back is back only, and is that portion which lies between the angle at the base of the ears, as in the Burns patent. For illus-

tration: If the back of the Burns blank were bent into U-shape, then you would have defendant's blank, but not Clark's.

X Ques. 35. Then, if I understand you, you make no distinction between the shape of the back of defendant's blank and a U-shape of the same portion?

Ans. 35. I have so testified in regard to Defendant's Ex-
84 hibit "Savage's Modified Clark Blank." It only being essential that with that U-shape portion the angles of the ears shall be defined in the blank itself, and not by subsequent operation.

X Ques. 36. Then, if the only material curvature of the body of the Clark blank were that curvature which it has in common with Defendant's Exhibit "Savage's modified Clark Blank," the body of defendant's blank would be equivalent of the body of complainant's blank. Please to understand that I do not ask for your opinion whether or not the supposition is based upon a true construction of the patent of Clark.

Ans. 36. The Clark blank has no curvature in common with that of defendant's blank; it is a curvature of an entirely different character; the supposed curvature in question necessarily implies the curvature of defendant's blank.

X Ques. 37. I repeat, if the only material curvature of the Clark back or body is that which it has in common with Defendant's Exhibit "Savage's modified Clark Blank," to wit, the U-shape portion, then the back or body of the defendant's blank has the equivalent of the curvature of the Clark blank, has it not?

Ans. 37. If the Clark blank were like the defendant's blank, or *vice versa*, then they would be alike, but under no other condition can these backs be of the same curvature or bend. The back of one cannot be separated from the other parts of the blank so as to give it any distinguishing characteristic.

X Ques. 38. I understand that if, as you have said, the back or body of defendant's blank is the equivalent of the curved back or body of Defendant's Exhibit "Savage's modified Clark Blank,"
85 and if, as I assume, the only curvature of the body of the Clark blank is the U portion, between the rounded portions, where the arms join the body, then the back of the defendant's blank must be, on such assumption, the equivalent of the back of the Clark blank; do you differ from me in that respect?

Ans. 38. I do; for it is impossible to make such an assumption, for if the "blank had a curvature or bent back like Defendant's Exhibit "Savage's modified Clark Blank," it is not the Clark back or blank.

X Ques. 39. Suppose, then, the Clark patent were so construed as to make the curved body thereof include the curved body of Defendant's Exhibit "Savage's modified Clark Blank," it would, on the same construction, include the back of defendant's back, would it not?

Ans. 39. If the patent is construed so broadly as to include defendant's blank, I answer yes.

X Ques. 40. The defendant's blank is unlike the Burns blank, in the fact that the ears are not bent, is it not?

Ans. 40. It differs in that the bend at the angle is inside the angle or in the back, and the ears straight; whereas, in the Burns patent the body is straight and the bend is outside the angle, and in the ears the difference between the two being in simply changing the bend from one side of the angle to the other; otherwise they are the same, and are made under precisely the same process; that is, the angle is formed before bending up the ears.

X Ques. 41. Or, as I said in my question, the Burns arms are bent, and the arms of the defendant's blank are not bent, and they are unlike in this respect?

86 Ans. 41. The only difference is as I have stated; that is, that the bend in one is on one side of the angle, and on the other the other side; they are unlike in this respect; but I am not to be understood as to say that this is a substantial difference.

X Ques. 42. Was the statement involved in my last question correct?

Ans. 42. I have said yes in my last answer.

X Ques. 43. Does not the Burns blank differ from the Clark blank in precisely the same respect as the respect in which it differs from defendant's blank, as pointed out by you in X Ques. 40; that is to say, have you not claimed that the bend inside of the straight ears of the Clark blank is a part of the back?

Ans. 43. There are no ears formed in the Clark blank so as to determine their final shape. I have said that the rounded portion between the bent body and the oblique arms is what will be a part of the body and a part of the ears; that is, those bent portions go to form and fill out the angles and complete the shape of the body and ears.

X Ques. 44. You say, in reply to Question 6, among other things, "the length of the straight body portion or what is to be the inside, measures just what the finished shackle will measure between the ears, to wit, one inch and a half" (referring, of course, to a particular size represented by Exhibit No. 1). That being the case, what becomes of the metal between the straight body portion, to which you referred, and the angles of the ears, I mean the part represented by the two oblique faces of Exhibit No. 1?

87 Ans. 44. I stated in my answer as to the lengthening or shortening of the blank, that the blank No. 1, being bent or struck up into the shape of Exhibit No. 5, must be increased in length and not upset; this increase in length necessarily must be made across the back between the two angles, because the ears and their angles are clearly defined, the metal therefor to make this increase in length must come from the oblique portions referred to in the questions.

X Ques. 45. Then the bend in the body of the blank is essential to the production of a back which is straight, and filled out from sharp angle to sharp angle of the bent up blank, is it not?

Ans. 45. Some elongation of the metal between those points is essential, supposing your question to refer to blank like defendant's, not Burns.

X Ques. 46. Is there anything in the Smith improvement, what-

ever it may be, which enables the dispensing with that shaping of the back which you have pronounced to be the equivalent of a U?

Ans. 46. If there be anything in the Smith improvement it is in transferring the curve from the outside of the angle, as in the Burns patent, to the inside, and if this inside curve of the Smith patent be dispensed with, then it must be placed on the outside, then it would not be the Smith patent.

X Ques. 47. Is there anything in the Smith improvement, whatever it may be, which enables the blank to dispense with the curvature of the back?

Ans. 47. There is no description of any other construction in the patent.

88 X Ques. 48. I find that the back of Exhibit No. 5, from corner to corner, is two inches and a quarter, and that the sum of the three faces on Exhibit No. 1, which are to make that back, is considerably less than two inches. Now, does not the straightening of the body of the blank have to expand and push out the metal adjacent to these three faces, in order to form the sharp corners which are two inches apart when the blank is bent up into the form of Exhibit No. 5?

Ans 48. No, sir; it does not. It cannot do that, because the sharp corners are already formed and determined; pressing down the flat portion of the back the inside of the back, or flat portion with its two inclined adjacent portions is very much longer than the inside is to be when finished; the surplus metal then is simply forced downward and not "pushed outward," and that operation has nothing whatever to do with forming the sharp corners.

X Ques. 49. How can the obtuse angles of Exhibit No. 1, which are now very much less than two inches apart, measured along the surface of the metal, be transformed into right angles two inches and a quarter apart unless the surface of the metal which is between them is expanded or pushed outward?

Ans. 49. There can be no pushing out of the metal toward the angle, because there is already as much more metal in the vicinity of the angle than is required there, as the angle is greater than a right angle; therefore, instead of the surplus metal being pushed toward the angle, it must be pushed away from the angle and toward the center; it cannot be pushed toward the angle because the

89 angle, having already too much metal near it, more cannot be pushed there; the bringing of the upper portion between the ears into a straight line contracts that portion and forces the metal down into the center and so as to produce the necessary elongation of the back between the two previously formed sharp corners.

X Ques. 50. I find that the prick punch marks on the "Exhibit Blank for Bending Dies" are about an inch and a quarter apart, measured along the surface of the metal, while the corresponding prick punch marks on "Exhibit Bending Dies Bent Blank" are an inch and a half apart. Do you wish to be understood as saying that no portion of the metal has been spread apart or pushed outward in causing those prick punch marks to be in the sharp corners of the bent-up blank?

Ans. 50. Yes, sir; I do, for the reason that those prick punch marks "Exhibit Bending Dies Bent Blank" were made on the sharp angle, as they are in "Exhibit Blank for Bending Dies," and after being struck in the bending dies, that part of the prick punch mark outside of the angle and on the face of the ears is preserved substantially intact, while on the back the burr raised by the prick punch is simply flattened down, had there been any outward movement of the metal the prick punch marks would have been substantially obliterated; again, the oblique portion has been changed so as to be a right angle; hence, the additional metal which would make the right angle of the "Exhibit Bending Dies Bent Blank," an obtuse angle has been moved somewhere, and certainly not toward the angle, for that is unchanged; and inasmuch as the back between the two angles measures a quarter of an inch more in "Exhibit Bending Dies Bent Blank" than it does in Exhibit Blank for
90 Bending Dies, and the metal at the angles remains unchanged, the only inference that can be drawn is that the surplus metal has been forced toward the center to produce that elongation.

X Ques. 51. Do we agree in this, that the particles of metal adjacent to the prick punch marks are a quarter of an inch further apart after the back is straightened than they were before the back was straightened?

Ans. 51. That depends very much upon what you mean by the term adjacent; if you mean those particles of metal which lie at the extreme angle at a line across the prick punch marks, those angles or particles are one-quarter of an inch further apart than they were before the ears were turned up.

X Ques. 52. Now could those particles of metal be placed a quarter of an inch further apart without an expansion of the same portion of the metal between them, whereby those particles were pushed outward?

Ans. 52. If by the term "pushed" you mean an operation for which that term (counsel for complainant interposes to say that he means that they did not go voluntarily, but under compulsion), has hereinbefore been used, and which implies a change of the particles relative to the ears and angle, then I answer no, because those particles are in precisely the same relative position to the angles and ears that they were before the bending up took place.

X Q. 53. I disclaim having used the term pused outward in any other sense than in the sense of being spread apart by the compulsion involved in staightening the bent back of the blank, and I again ask how those particles of metal which are adjacent to
91 the prick punch marks in the bent up blank are a quarter of an inch further apart than in the blank before bending up, unless some portion of the metal between those particles were expanded so as to push them outward?

Ans. 53. As I have before stated, the surplus metal is forced into the back, shortening upon the upper side as it elongates on the under side, but without in any manner changing the particles of metal at and relative to their respective angles.

X Ques. 54. Do you mean by anything in your last answer to

deny that the particles of metal which are adjacent to the prick-punch marks in the angles of the bent-up blank, and which were a quarter of an inch nearer together in the blank before bending up the ears, were pushed outward and apart that quarter of an inch by the intermediate operation?

Ans. 54. I mean to deny that they were pushed outward in the only sense that that term pushed has been used in this examination, and quoted from the Clark patent; that is, in the sense that they are pushed or forced outward to form an angle from surplus metal, or that the particles have been changed relatively to the angles which they formed before bending up; but I do not wish to be understood as denying that those defined angles have been forced from each other by driving surplus metal between them.

X Ques. 55. Can you not answer yes or no to the last question? It was intended to be very plain, and to leave all question of construction of the patent to the court. Please hear it read again, and, if possible, answer yes or no.

(Previous question read again.)

92 Ans. 55. I could were I certain of the idea you intended to convey by the terms used in your questions. With the explanations in my last answer it it is either yes or no, according to your meaning.

X Ques. 56. Could the particles of metal be further apart after the intermediate operation than they were prior thereto, unless they were pushed apart or outward during and by that intermediate operation? I refer to the comparison between the plaintiff's blanks Nos. 1 and 5 and the comparison between the prick punch exhibits.

Ans. 56, There must have been something forced between them to make up the increased distance, as I have before stated.

X Ques. 57. Inasmuch as you refuse to say that the particles of metal are pushed apart and outward, I will assume that you are of opinion that such is not the case. Am I right?

Ans. 57. In the sense that the word "pushed" has been used, as before mentioned, and in the Clark's patent, you are right, because that the term means a movement of the particles of metal to shape and form the angles.

X Ques. 58. I am sorry you persist in refusing to look at the subject from a mechanical point of view, and insist upon interpreting the patent. Are there any sharp right-angled corners upon defendant's blank?

Ans. 58. I have looked at the subject in a mechanical point of view, and never, until this case, have I heard the term pushed applied to such a movement of the particles of metal. There are sharp angles clearly defining the shape of the ears, as called for by the patent. It is true in the blank they are not, strictly speak-
93 ing, right angles, but they are equivalents therefor; hence, I say they are substantially right angles.

(Answer objected to, as involving the construction of some patent or other.)

X Ques. 59. Is not the angle quite obtuse on "Exhibit Blank for Bending Dies?"

Ans. 59. It is obtuse, but it might be very much more so, as it is very much nearer a right angle than it is with the same plane with the ears.

X Ques. 60. Suppose the obtuse angle corner on that exhibit were rounded off so as that there was no abrupt and well-defined corner, but were, instead thereof, a sharp rounded bend, would not the same effect be produced in the operation of straightening the back and bending up the ears that is now produced?

Ans. 60. No, sir, there would not; if the corner be rounded there would be an operation to be performed to fill out and form the angle and a different movement of the metal, because then there would be a part of the ear to be shaped; whereas, in the other case, the ear and angle are completely shaped and predetermined.

X Ques. 61. Then, it is your opinion, is it, that a blank formed as described in the last question would be outside of the Smith patent?

Ans. 61. If I understand your description of the rounded corner, yes, sir. It would then come under the second process for forming angles.

X Ques. 62. By my description I mean a blank just like defend-
ant's blank, only rounded just enough to take away the
94 abrupt angle, but not enough to prevent the forming of
sharp corners in the intermediate operation.

Ans. 62. With so nice a drawn distinction, I decline to answer the question without such a blank is shown me, that I may see what is meant by the rounded corner.

X Ques. 63. How can the particles of metal in the apex of an obtuse angle be got into the apex of a right angular mould without being pushed there?

Ans. 63. The angle being formed, the particles of metal at the apex remains unchanged; change the angle which way you please, the particles which are moved are each side the apex.

X Ques. 64. How can that be the case when in the operation of bending the particles of metal in the apex of each of the obtuse angles have to be moved a very considerable distance by being pushed outward before they reach the right angled mould?

Ans. 64. In bending the two sides of an obtuse angle into a right angle, it cannot be said that the particles of one side of the angle are moved any more than those of the other side; the sides approach each other from the obtuse to the right angle; it is the angles and the adjacent metal which are moved away from each other by forcing something between them.

X Ques. 65. Do you mean by anything in your answer to question 16 that the criticism made in said answer is in any way material to any question or comparison for which any questien or comparison in this case is made?

Ans. 65. No further than to account for the great quantity of
metal in the angle of Exhibit No. 5 and Exhibit No. 1 than
95 the general increase quantity of metal through the ears; I

simply wish to show that No. 5 could not be made from a blank like Exhibit No. 1; otherwise, they are substantially alike.

X Ques. 66. Since you claim there is a difference, would the shaping up of a blank like Exhibit No. 1 produce a shackle the length of whose back and ears would be different in any substantial sense from Exhibit No. 5?

Ans. 66. If made to a shackle with the same width between the ears, Exhibit No. 5, there would be a slight difference, due to the difference in the thickness of the metal. The blank, Exhibit No. 1, was evidently made for the same sized shackle as Exhibit No. 5, to wit, one and a half.

X Ques. 67. You find, do you not, that the metal of Exhibit No. 5 as a whole is shorter than the metal of Exhibit No. 1?

Ans. 67. No, sir; it is longer, as I defined it yesterday, on the outside. The inside is shorter, and inasmuch as the surplus from the inside goes to make up for the outside, so the proper average is that they are of the same length.

X Ques. 68. Is not the length of Exhibit No. 1, as ascertained by taking the average of its inside and outside length, greater than the lengthof Exhibit No. 5, as ascertained by taking the average of its inside and outside length?

Ans. 68. The comparative average of the two cannot be properly made as to its length because of the difference in thickness of metal. The back of Exhibit No. 1 is nearly the thirty-secondth of an inch thicker than that of Exhibit No. 5. These differences make it improper to compare an average measurement, the differences
96 of thickness of the back may be due to the striking up of Exhibit No. 5 from the blank, or the blank itself.

X Ques. 69, I do not appreciate the reasons given in the last answer, especially as you concede that the difference in thickness may be due to the operation of striking up; but since you regard them as of importance, please answer the same question with reference to "Exhibit Blanks for Bending Dies" and "Exhibit Bending Dies Bent Blank."

Ans. 69. "Exhibit Blank for Bending Dies" measures $3\frac{4}{16}$ inches upon its outside and 4 inches upon its inside, making an average of $3\frac{5}{16}$; the shackle "Exhibit Bending Dies Bent Blank" measures $4\frac{7}{16}$ outside, $3\frac{5}{16}$ inside, making an average of $3\frac{4}{16}$; these are measurements which I have made hastily, but believe it is accurate.

X Ques. 70. In forming up the "blank bending dies bent blank," from "blank for bending dies," has not the thickness of the bent up blank, as compared, and the blank to be bent up been lessened quite considerably by the operation of bending up?

Ans. 70. It is considerably thinner, but whether it is all due to striking up or not it is impossible to say; undoubtedly a portion of it is.

X Ques. 71. Do you find on defendant's blank, "Exhibit Blank for Bending Dies," the right angular corners *h h*, shown in Fig. 4 of the Smith patent, what I described—the specification of the Smith patent as formed at right angles, and as remaining unmolested in the operation of bending?

Ans. 71. Substantially yes, as I have before stated.

X Ques. 72. I have on Fig. 4 of the drawing of the Smith
97 patent drawn lines completely cutting off the right angles *h h*. Will you now please compare what is left, after the removal of the parts *h h* with "Exhibit Blank for Bending Dies," and say whether "Exhibit Blank for Bending Dies" is not substantially the same as drawing Fig. 4 without the parts *h h*?

Ans. 72. If the cutting off that corner, as you have done by the lines in Fig. 4, implies that in bending up, that angle is to be filled in the process of striking up, then it is not defendant's blank or the blank of the patent, because the angle would not be formed before bedding, but requires an upsetting of the metal to shape that angle. If, however, the angles which are made by your lines with outside surfaces of the ear portions is the final or predetermined angles of the ears, then it is defendant's blank "Exhibit Blank for Bending Dies," and in bending up the ears would be shortened by just so much as you have cut off.

X Ques. 73. So far as you can judge by looking at the Smith patent, Fig. 4, with the angles *h h* cut off, and looking at "Exhibit Blank for Bending Dies," is there any substantial difference between them?

Ans. 73. Yes, sir; because the drawing represents the formed angles cut off, which they are not in the exhibit.

X Ques. 74. You do not mean, of course, that on the exhibit in question there are right angles *h h*, having sides built up of like portions at right angles to the faces of the arms or ears, I presume?

Ans. 74. I mean to say that the exhibit has the angles *h h* of the patent, and they are not built up from anything. They are
98 already there, and are the same angles which determine and make the shape of the complete ear before it is bent.

Redirect examination by O. H. PLATT:

R. D. Ques. 75. The body of complainant's blank, as shown in his patent, and in Exhibit "Clark's Blank," is in the shape of a segment of a circle, and the body of defendant's blank consists in shape of three planes. In striking up such blank into shackles, the blow of the hammer falls, in case of complainant's blank, upon a curved or arched surface; in case of the defendant's blank, upon a plane surface. Is the displacement or distribution of the metal by the blow the same or similar in the two blanks?

Ans. 75. No; entirely in defendant's blank the metal moved is that between the flat plane surfaces and the ears; there is no movement over or through the central part; in straightening a plane surface, as in complainant's, there is movement of the entire metal laterally, that is, so as to produce what the patent calls pushing out the metal to fill the rounded corners.

R. D. Ques. 76. In complainant's blank is there anything by which the point where the sharp corners will be located in the struck up shackle can be determined?

Ans. 76. No, sir; on the contrary it is impossible to tell where it

simply wish to show that No. 5 could not be made from a blank like Exhibit No. 1; otherwise, they are substantially alike.

X Ques. 66. Since you claim there is a difference, would the shaping up of a blank like Exhibit No. 1 produce a shackle the length of whose back and ears would be different in any substantial sense from Exhibit No. 5?

Ans. 66. If made to a shackle with the same width between the ears, Exhibit No. 5, there would be a slight difference, due to the difference in the thickness of the metal. The blank, Exhibit No. 1, was evidently made for the same sized shackle as Exhibit No. 5, to wit, one and a half.

X Ques. 67. You find, do you not, that the metal of Exhibit No. 5 as a whole is shorter than the metal of Exhibit No. 1?

Ans. 67. No, sir; it is longer, as I defined it yesterday, on the outside. The inside is shorter, and inasmuch as the surplus from the inside goes to make up for the outside, so the proper average is that they are of the same length.

X Ques. 68. Is not the length of Exhibit No. 1, as ascertained by taking the average of its inside and outside length, greater than the lengthof Exhibit No. 5, as ascertained by taking the average of its inside and outside length?

Ans. 68. The comparative average of the two cannot be properly made as to its length because of the difference in thickness of metal. The back of Exhibit No. 1 is nearly the thirty-secondth of an inch thicker than that of Exhibit No. 5. These differences make it improper to compare an average measurement, the differences
96 of thickness of the back may be due to the striking up of Exhibit No. 5 from the blank, or the blank itself.

X Ques. 69, I do not appreciate the reasons given in the last answer, especially as you concede that the difference in thickness may be due to the operation of striking up; but since you regard them as of importance, please answer the same question with reference to "Exhibit Blanks for Bending Dies" and "Exhibit Bending Dies Bent Blank."

Ans. 69. "Exhibit Blank for Bending Dies" measures $3\frac{4}{16}$ inches upon its outside and 4 inches upon its inside, making an average of $3\frac{5}{16}$; the shackle "Exhibit Bending Dies Bent Blank" measures $4\frac{7}{16}$ outside, $3\frac{5}{16}$ inside, making an average of $3\frac{4}{16}$; these are measurements which I have made hastily, but believe it is accurate.

X Ques. 70. In forming up the "blank bending dies bent blank," from "blank for bending dies," has not the thickness of the bent up blank, as compared, and the blank to be bent up been lessened quite considerably by the operation of bending up?

Ans. 70. It is considerably thinner, but whether it is all due to striking up or not it is impossible to say; undoubtedly a portion of it is.

X Ques. 71. Do you find on defendant's blank, "Exhibit Blank for Bending Dies," the right angular corners *h h*, shown in Fig. 4 of the Smith patent, what I described—the specification of the Smith patent as formed at right angles, and as remaining unmolested in the operation of bending?

Ans. 71. Substantially yes, as I have before stated.

X Ques. 72. I have on Fig. 4 of the drawing of the Smith
97 patent drawn lines completely cutting off the right angles *h h*. Will you now please compare what is left, after the removal of the parts *h h* with "Exhibit Blank for Bending Dies," and say whether "Exhibit Blank for Bending Dies" is not substantially the same as drawing Fig. 4 without the parts *h h*?

Ans. 72. If the cutting off that corner, as you have done by the lines in Fig. 4, implies that in bending up, that angle is to be filled in the process of striking up, then it is not defendant's blank or the blank of the patent, because the angle would not be formed before bedding, but requires an upsetting of the metal to shape that angle. If, however, the angles which are made by your lines with outside surfaces of the ear portions is the final or predetermined angles of the ears, then it is defendant's blank "Exhibit Blank for Bending Dies," and in bending up the ears would be shortened by just so much as you have cut off.

X Ques. 73. So far as you can judge by looking at the Smith patent, Fig. 4, with the angles *h h* cut off, and looking at "Exhibit Blank for Bending Dies," is there any substantial difference between them?

Ans. 73. Yes, sir; because the drawing represents the formed angles cut off, which they are not in the exhibit.

X Ques. 74. You do not mean, of course, that on the exhibit in question there are right angles *h h*, having sides built up of like portions at right angles to the faces of the arms or ears, I presume?

Ans. 74. I mean to say that the exhibit has the angles *h h* of the
98 patent, and they are not built up from anything. They are already there, and are the same angles which determine and make the shape of the complete ear before it is bent.

Redirect examination by O. H. PLATT:

R. D. Ques. 75. The body of complainant's blank, as shown in his patent, and in Exhibit "Clark's Blank," is in the shape of a segment of a circle, and the body of defendant's blank consists in shape of three planes. In striking up such blank into shackles, the blow of the hammer falls, in case of complainant's blank, upon a curved or arched surface; in case of the defendant's blank, upon a plane surface. Is the displacement or distribution of the metal by the blow the same or similar in the two blanks?

Ans. 75. No; entirely in defendant's blank the metal moved is that between the flat plane surfaces and the ears; there is no movement over or through the central part; in straightening a plane surface, as in complainant's, there is movement of the entire metal laterally, that is, so as to produce what the patent calls pushing out the metal to fill the rounded corners.

R. D. Ques. 76. In complainant's blank is there anything by which the point where the sharp corners will be located in the struck up shackle can be determined?

Ans. 76. No, sir; on the contrary it is impossible to tell where it

will be; it will depend entirely upon the die from which it is struck.

R. D. Ques. 77. What function do you understand is performed by the material pushed out, as described in the Clark patent?

Ans. 77. It simply forces the metal to the right and left to
99 fill up the rounded portions and shape and form the angle.

R. D. Ques. 78. Look at Complainant's "Exhibit No. 6" and compare it with Complainant's "Exhibit No. 4," and describe the process by which the back of shackle "Exhibit No. 6" is formed from the blank "Exhibit No. 4"?

Ans. 78. The flat side of "Exhibit No. 4" is what is to be the inside of the finished shackle; the projections upon the opposite side are what are to form the outside angles. Suppose this blank to be placed in a die like "Exhibit Defendant's Bending Die," with the flat side up and the follower brought down upon it, as it is upon defendant's blank, the ends will be bent upward, the central portion forced downward to form the flat back; that is, straightening between the extreme points of the projections and form a shackle like "Exhibit No. 6."

R. D. Ques. 79. The formation of the back, then, independent of making the angles, is by pushing the metal down, as I understand you. Am I right?

Ans. 79. Yes, sir. It will be observed that the points of the projections are nearer together than the angles of the complete shackle; hence, forcing down the flat and curved portions between those two points forces those points away from each other to the position of the angles and forms a flat back.

R. D. Ques. 80. Is there any difference between the process by which the defendant's shackle is formed and Complainant's "Exhibit No. 6" is formed? I refer to the back alone.

Ans. 80. No, sir; the processes are substantially identical; the angles are forced asunder by driving the metal between them in both cases.

R. D. Ques. 81. How in regard to the process of forming
100 the back of complainant's shackle, independent of the sharp corners?

Ans. 81. Independent of the corners or angles, forcing down the back of complainant's shackle would make a straight back, but would leave the corners rounded, substantially as in the old style shackle; that would do away with the novelty of complainant's patent, which consists in forcing metal into the angles by the straightening of the body, or the same thing, preparing a blank which must be so treated in order to form right angles or sharp corners.

R. D. Ques. 82. Do you understand that anything more is covered by, or claimed in, complainant's patent than the construction of a blank of such form that, when it is struck into a shackle, the corners of the shackle will be formed by this forcing of metal into them, and dies therefor?

Ans. 82. No, sir; I do not.

JOHN E. EARLE.

Subscribed and sworn to before me, this twenty-sixth day of June, 1880.

CHARLES H. SHAW,
Notary Public.

WILLIS B. SMITH, a witness produced on the part of the defendant, being called and sworn, deposes and says:

Ques. 1. What is your name, age, residence, and occupation?

Ans. 1. My name is Willis B. Smith; by trade, a blacksmith; 58 years old.

Ques. 2. Have you had any experience in making dies; and,
101 if so, for how long?

Ans. 2. I have, but have not made them myself.

Ques. 3. For whom were you at work in 1867, and for whom have you been at work since that time?

Ans. 3. J. B. Savage.

Ques. 4. Look at the dies and the blank now shown to you and state whether you have ever seen them before, and what they are respectively.

Ans. 4. I have seen them. They are a set of dies for striking a shackle blank: they are what is called Clark's patent; the blank is called Clark's blank, and is struck in the die.

(The die referred to and blank referred to are offered in evidence by the defendants, and marked respectively "Defendant's Exhibit Clark's Die" and Defeudant's "Exhibit Clark's Old Shackle Blank.")

Ques. 5. Where did you first see the exhibit referred to in the last question, namely, Clark's dies and Clark's old shackle blank?

Ans. 5. At J. B. Savage's shop. They were brought in there by Clark as his patent, I should think, in 1867, or later; I did not take it down.

Ques. 6. Can you tell how nearly to the time of Clark's obtaining his patent that you first saw these dies?

Ans. 6. It was before he got the patent that I saw the dies, if I recollect; they were cast from the model he sent to Washington, I suppose.

Ques. 7. About what time was the blank "Exhibit Clark's Old Shackle Blank" struck, and where was it struck?

102 Ans. 7. The time was before he got a patent; I think in January of 1867?

Ques. 8. Was it or not about the time that he was applying for a patent?

Ans. 8. It was.

Ques. 9. What were and what were since been your duties at Mr. Savage's shop?

Ans. 9. At the time the dies were made I had charge of the machine and shackle forging.

Ques. 10. State whether these dies, Defendant's "Exhibit Clark's Dies," were used in Mr. Savage's factory soon after they were made?

Ans. They were.

Ques. 11. State whether any changes were made in dies for forming blanks under Clark's patent; and, if so, what those changes were, and the reason for such changes.

Ans. 11. We planed into the upper dies so as to get a square corner; we could not trim them, and we raised the ears of the shackle.

Ques. 12. What was the object or necessity of planing into the upper dies so as to produce a square corner?

Ans. 12. It was to let the stock come up into the upper die. We must have a square corner on the shackle blank in order to make the shackle perfect.

Ques. 13. What has become of the dies, the upper one of which was planed into so as to form a square corner on the shackle blank?

Ans. 13. They are brobably broken up; they have not used dies for making Clark's shackle blanks in Mr. Savage's factory since 1871.

103 Ques. 14. How many times were the dies changed, as you recollect?

Ans. 14. It is impossible to tell; we kept raising them so as to raise the ears, until the ears were almost straight.

Ques. 15. Dook at Defendant's "Exhibit Savage's Modified Clark Blank" and state whether you have ever seen it before; and, if so, what you know about where it came from.

Ans. 15. I have seen it before, it came from Savage's factory.

Ques. 16. What stage of the attempt to manufacture blanks under the Clark patent does it represent?

Ans. 16. This is the last shape.

Ques. 17. Were the dies changed from the form in which they originally were, as shown in Defendant's "Exhibit Clark's Dies" to the form which produced Defendant's "Exhibit Savage's Modified Clark Blank" by one alteration or by several successive alterations?

Ans. 17. By alterations at several different times.

Ques. 18. Who made the alterations in the dies?

Ans. 18. That is something I could not answer.

Ques. 19. Why can't you answer?

Ans. 19. There have been so many making the alterations that I can't bring to mind who made them.

Ques. 20. Did you find it practicable to make shackles with full sharp corners from blanks with rounded corners, as shown in Defendant's "Exhibit Clark's Old Shackle Blank"?

Ans. 20. Certainly.

Ques. 21. How did you square the corners so that the shackle
104 should, when finished, have full square and sharp corners?

Ans. 21. We bend it up first by putting it in a bender; we place a former inside and bend it up to the size we are going to make the shackle; we then place another former inside the ears and clamp it up in a vice, and then smooth it off with a hammer.

Ques. 22. What portion of it was hammered by hand to square the corners?

Ans. 22. We hammer over the whole surface, back and sides.

Ques. 23. If, as you say, it was practicable to form square corners on the shackle from rounded corners on the blank, why did you plane out the upper die so as to square the corners of the blank in the dies?

Ans. 23. It is necessary to plane out the upper die, so that when the die comes down it shall make the corners square on the blank.

Ques. 24. Why was it necessary?

Ans. 24. It is necessary to have the impression in the top die which forms the corners.

Ques. 25. Was it any better to have the corners square than round?

Ans. 25. It was.

Ques. 26. Why was it better that the corners should be square than round?

Ans. 26. It was necessary that the shackle should have square corners; a round shackle we could hammer out by hand, but it took too much labor.

105 Cross-examination by C. E. MITCHELL:

X Ques. 1. Was J. B. Savage a licensee under the Clark patent?

Ans. 1. I don't know whether he owned the patent. He paid a royalty on it.

X Ques. 2. Was J. B. Clark, the inventor of the Clark blank and die, at work for Savage at the time when the modifications of his invention were made, of which you have spoken?

Ans. 2. He was not.

X Ques. 3. Was he about the shop at about the time when his patent was obtained, and after that time?

Ans. 3. He was.

X Ques. 4. What did he seem to be doing?

Ans. 4. At leisure more than anything else.

X Ques. 5. Did he not, to a greater or less degree, have charge of the introduction and use of his dies at the Savage factory?

Ans. 5. He was there at different times looking after these dies.

X Ques. 6. How long were the original dies brought to the shop by Clark used at the factory?

Ans. 6. We might have struck a few hundred of them, but we changed them at once.

X Ques. 7. Do you mean you changed the original dies themselves?

Ans. 7. Yes.

X Ques. 8. How?

106 Ans. 8. By straightening up the ears of the shackle.

X Ques. 9. Why do not the dies referred to show that change?

Ans. 9. Because we have not got them here to show; we have the blanks here, but not the dies.

X Ques. 10. Will you produce the blanks to which you refer in your last answer?

Ans. 10. There is one. (Witness produces a blank, which is marked "First Alteration Clark's Blank.")

X Ques. 11. I understood you to say that the original dies brought to the factory by Clark are the identical dies now marked "Defendant's Exhibit Clark Die." Am I right?

Ans. 11. You are right.

X Ques. 12. Have these dies ever been altered?

Ans. 12. They have.

X Ques. 13. By ploughing out the upper die, so as to make a square corner?

Ans. 13. No, sir; I was mistaken. On examination, it has not.

X Ques. 14. When was the blank marked "Defendant's Exhibit First Alteration Clark's Blank" made?

Ans. 14. I could not tell; it was made when we first commenced making them.

X Ques. 15. What makes it look so new?

Ans. 15. I could not tell; it has been in my attic for perhaps ten years.

X Ques. 16. Why are not the corners sharp, instead of being rounded? Is it not because the metal would not fill the upper die after it was planed out?

107 Ans. 16. There was not metal enough in the blank to fill it.

X Ques. 17. That was necessarily the case, was it not, when the blank was bent under the action of the dies, without being previously thickened where the corners were to be?

Ans. 17. I do not understand the question.

X Ques. 18. The change from the shape shown in "Defendant's Exhibit Old Shackle Blank" to the shape shown in "Defendant's Exhibit First Alteration Clark's Shackle Blank" does not show any substantial change in the curvature of the back; why was not the back straightened out, instead of being left bent?

Ans. 18. I could not tell why it happened so.

X Ques. 19. Did they try to use straight backs, instead of curved ones, in shackle blanks?

Ans. 19. No, sir; they did not.

X Ques. 20. Could you get along any better without a bent back in "Defendant's Exhibit First Alteration Clark's Blank" than in "Defendant's Exhibit Clark's Old Shackle Blank"?

Ans. 20. I don't know that we could; it don't make much difference any way.

X Ques. 21. What was the advantage of the bent back in the Clark shackle?

Ans. 21. I could not tell.

X Ques. 22. The next change or modification in the Clark blank, as made at Savage's, consisted in making the ears more nearly in the same plane, as shown in "Defendant's Exhibit Savage's Modified Clark Blank." Do you know why they still use the bent back?

108 (Question objected to, because it assumes that the only difference between the blank "Exhibit Savage's Modified Clark

Blank" and the blank "Exhibit First Alteration Clark's Blank" consists in the making of the ears in the former more nearly in the same plane, and because it assumes that there were no intermediate changes.)

Ans. 22. I don't know as I could tell.

X Ques. 23. Then, if I understand you, from 1867 to 1871 Clark's blanks, under various modifications, were made at J. B. Savage's, but all the modifications had the bent back feature. Am I right?

Ans. 23. Yes, sir.

Adjourned to June 30, 1880, at 10 a. m.

Cross-examination continued on June 30, 1880, 10 a. m:

X Ques. 24. And you worked at shackle forging for Savage during all that time?

Ans. 24. Yes, sir.

X Ques. 25. You are the patentee of the letters patent No. 106,225, dated Aug. 9, 1870, under which the defendant claims to make shackle blanks?

Ans. 25. Yes, sir.

X Ques. 26. And you were at work upon the Clark blanks when you applied for that patent?

Ans. 26. I was.

109 X Ques. 27. Do you still insist that you do not know why the body of the Clark blank was made curved, *i. e.*, what advantage was derived from the curvature?

Ans. 27. This curved back was gotten up to get around Burns' blank.

X Ques. 28. Do you still insist that you do not know what was the advantage of the bent back in the Clark shackle blank?

Ans. 28. There was no advantage over the straight back.

X Ques. 29. Why did you not use a straight back between the ear portions of the blank described in your patent?

Ans. 29. Burns' die was straight between the ears; I could not use that; in Burns' die, the back being straight, with a curved ear, you could not strike a perfectly square corner.

X Ques. 30. Was there any practical difficulty in trimming off the surplus metal from Defendant's "Exhibit Savage's Modified Clark Blank"?

Ans. 30. There was not.

X Ques. 31. Was there any practical difficulty in trimming off the surplus metal from the original form of the Clark blank when the ears were straight, *i. e.*, from a straight-eared Clark blank?

Ans. 31. There was; you could not trim it.

X Ques. 32. Please look at Defendant's "Exhibit First Alteration Clark's Blank," which is a straight-eared blank, and state, upon inspection, whether the surplus metal has not been trimmed off.

Ans. 32. It has, but spoils the shackle; this is straighter than the other.

110 X Ques. 33. Do you mean to say that Savage would have rejected the shackle blank "Defendant's Exhibit First Altera-

tion Clark's Blank" as a spoiled one, or do you mean that the blank is not as good a one as is produced when the ears are in the same or nearly in the same plane?

Ans. 33. He would have rejected it as a spoiled shackle.

X Ques. 34. How many straight-eared shackles did Savage make between the years 1867 and 1871; of the Clark kind, I mean, as nearly as you can estimate?

Ans. 34. We probably made about 25,000 pairs a year; probably one-half made in Clark's die?

X Ques. 35. The various alterations in the position of the ears in the Clark dies and the Clark blanks from Defendant's "Exhibit Clark's Old Shackle Blank" to "Defendant's Exhibit Savage's Modified Clark Blank" had for their object a better facility for trimming, did they not?

Ans. 35. One object was better facilities for trimming; the other was to make square corners.

X Ques. 36. How many straight-eared Clark blanks were made by Savage prior to 1871, as you estimate it?

Ans. 36. About half the blanks Savage made were straight-eared, as nearly as I can estimate it.

X Ques. 37. These were all trimmed so as to remove the surplus metal, were they not?

Ans. 37. They were.

X Ques. 38. Are you interested to have the defendants manufacture the shackle blanks which this suit seeks to prevent?

Ans. 38. No, sir.

111 X Ques. 39. Are you still the owner of any portion of your patent?

Ans. 39. I am the owner of one-half of it.

Redirect:

R. D. Ques. 40. Are you quite deaf?

Ans. 40. I am; I cannot distinguish sounds easily, although I hear them.

R. D. Ques. 41. How many alterations of the die, changing the form of the blank, were made between 1868 and 1871, to the best of your recollection?

Ans. 41. I should judge there were about seven.

R. D. Ques. 42. Did Mr. Savage stop making shackles entirely in 1871?

Ans. 42. He did not.

R. D. Ques. 43. How did he make them after 1871?

Ans. 43. He made them after my pattern.

R. D. Ques. 44. Between 1868 and 1871 did you do this forging yourself?

Ans. 44. I did the machine, but not the shackle, forging.

R. D. Ques. 45. Mr. Savage, as I understand it, had quite a large business other than shackle making, did he not?

Ans. 45. He did.

R. D. Ques. 46. How many straight-eared shackles did Mr. Savage

make between 1868 and 1871 from blanks having the ears set obliquely, as in Exhibit "Clark's Old Shackle"?

Ans. 46. Where they were set as low as that we could not make them We had to raise the ears right away; we could not trim them in that shape.

112 R. D. Ques. 47. Do you know why Mr. Savage abandoned the Clark shackle and adopted yours in 1871?

Ans. 47. I suppose I know; it was because he could not make a salable shackle out of the Clark blank.

(All but the first sentence of Ans. 47 objected to, witness clearly having no knowledge on the subject.)

Recross examination:

Re-X Ques. 48. Did any of the seven alterations or modifications of the Clark blank at Savage's, between 1868 and 1871, dispense with the curve or bend in the body of the blank?

Ans. 48. No, sir; they did not.

Re-X Ques. 49. All the alterations related to the elevation of the ears and the shaping of the junction between the ears and the body of the blank, did they not?

Ans. 49. I do not understand the question.

Re-X Ques. 50. Were not all of the seven modifications either in changing the elevation of the ears, or in changing the shape of the junction where the ears join the body?

Ans. 50. Yes; except that in making the alterations we changed the amount of curvature of the back.

Re-X Ques. 51. Do you know whether Clark claimed that all the blanks made subsequent to 1871, as well as before, were within this patent, and whether he had brought a suit against Savage to recover royalties thereon?

Ans. 51. He has not claimed them since 1871, to my knowl-
113 edge. There has been a suit between him and Mr. Savage in court for five years past about this shackle, but what about I don't know.

WILLIS B. SMITH.

Subscribed and sworn to before me, this 3d day of June, 1880.

CHARLES H. SHAW,
Notary Public.

JOHN GARVIN, a witness produced, sworn, and examined on the part of the defense, deposes and says:

Ques. 1. What is your name, age, residence, and occupation?

Ans. 1. Name, John Garvin; age, 39; residence, Meriden, C't; occupation, a blacksmith; have worked at drop forging since 1867.

Ques. 2. For whom do you now work?

Ans. 2. For the Beecher Manufacturing Company.

Ques. 3. Did you ever work for J. B. Savage; if so, in what years, and what did you do for him?

Ans. 3. I worked for J. B. Savage from 1867 to 1874, with exception of two months; I worked at forging shackles principally.

Ques. 4. Do you remember the fact that Mr. Savage commenced about 1868 to try to make shackles under the Clark patent?

Ans. 4. I do; but I think it was earlier.

Ques. 5. Look at Defendant's "Exhibit Clark's Tie," and Defendant's "Exhibit Clark's Old Shackle Blank," and say whether
114 they correctly represent the dies first used by Savage and the blanks produced thereby.

Ans. 5. They do correctly represent the same.

Ques. 6. State whether, between the time Savage so commenced work and 1871, any changes or alterations were made in the dies; and, if so, the character of such alterations.

Ans. 6. The changes were made to raise the ears and to make square corners.

Ques. 7. In striking up the shackle from the form of blank, Defendant's "Exhibit Clark's Old Shackle Blank," was there any difficulty in producing square outside corners?

Ans. 7. There was.

Ques. 8. How much difficulty?

Ans. 8. We could not produce a square corner from the blank of the shape of Defendant's "Exhibit Clark's Old Shackle Blank."

Ques. 9. How many alterations do you think were made in the dies during the period spoken of?

Ans. 9. Quite a number; I cannot state exactly how many.

Ques, 10. Look at the blank Defendant's "Exhibit Savage's Modified Clark Blank," and say whether that represents the last change, or whether there were other changes after that form was produced.

Ans. 10. There were changes later than that.

Ques. 11. In striking a shackle from a blank like the one last referred to, could you produce square corners?

Ans. 11. I could.

Ques. 12. Look at "Exhibit First Alteration of Clark's Blank," and state whether, in striking a shackle from that form of blank, you could produce square corners.

115 Ans. 12. We could not without more stock on the corners.

Ques. 13. You have stated that there were alterations in the form of the blank subsequent to Defendants' "Exhibit Modified Clark Blank." Look at the blank which I now hand you, and say whether that represents such later modification.

Ans. 13. It does.

(Blank referred to offered in evidence, marked "Defendant's Exhibit Savage's Last Modification of Clark's Blank.")

Ques. 14. In striking shackles from blanks like last-named exhibit, could you produce shackles with square outside corners?

Ans. 14. We could.

Cross-examination:

Ques. 15. How long have you worked for the Beecher Manufacturing Company?

Ans. 15. Six years the 12th day of July, 1880.

Ques. 16. Have you worked upon shackles all that time?

Ans. 16. Yes, excepting now and then a day at something else.

Ques. 17. When were dies like "Exhibit Bending Dies" first used for bending shackle blanks, to your knowledge?

Ans. 17. I think they were first used in April or May, 1871, at Savage's.

Ques. 18. They were not used, then, by Savage on blank marked Defendants' "Exhibit Clark's Old Shackle Blank?"

Ans. 18. They were not.

116 Ques. 19. If suitably shaped faces were made in the bending dies used since 1871, and the dies were made in other respects properly for the purpose, could not Defendants' Exhibit "Clark's Old Shackle Blank" be formed up so as to have right-angled corners?

Ans. 19. It would bend the ears at right angles, but would not make a square corner.

Ques. 20. Why would it not make a square corner?

Ans. 20. Because there is not metal enough to do it.

Ques. 21. Could not more metal be obtained by making the curvature of the body a little greater?

Ans. 21. It could not be done without making an accumulation of stock at the corners.

Ques. 22. Is there as great an accumulation of stock at corners on "Exhibit Blank for Bending Dies" as on corners of Defendants' "Exhibit Clark's Old Shackle Blank?"

Ans. 22. I think it will take an expert to determine. The blank "Exhibit Clark's Old Shackle Blank" is as heavy again as "Exhibit Blank for Bending Dies."

Ques. 23. I asked for the relative size of the accumulations. Is not there as much accumulated stock on Defendants' "Exhibit Clark's Old Shackle Blank" as on "Exhibit for Bending Dies," in proportion as to thickness?

Ans. 23. I don't think there is, to look at it.

Ques. 24. When did Savage get square corners on his shackles first?

Ans. 24. I could not tell you; when I came there in Aug., 1867, they were making shackles with square corners, and they were

117 made by accumulating stock in the corners of the blank.

Ques. 25. Do you find as much accumulation of stock, proportionately, in Defendant's "Exhibit Savage's last Modification of Clark's Blank," as in the proceding form represented by Defendant's "Exhibit Savage's Modified Clark Blank?"

Ans. 25. I should say there was more, proportionately, in Defendant's "Exhibit Savage's Modified Clark Blank."

Ques. 26. Is there any more stock accumulated in the corners of defendant's blank, as represented by "Exhibit Blank for Bending Dies," than in "Defendant's Exhibit Savage's Last Modification Clark's Blank," proportionately, I mean?

Ans. 26. I do not think there is.

Ques. 27. Could any of these blanks, such as Defendant's "Exhibit Savage's Last Modification of Clark's Blank" or Exhibit No. 1, or

"Exhibit Blank for Bending Dies," or any of the defendant's blanks which you see before you, have sharp corners produced by the act of bending them up, if the backs were not bent or hollow?

Ans. 27. No; not to make perfect corners, for the reason that, if being upset to make the corners square on the outside, there would be a cold shut on the inside corners, thereby making the ears weak.

Ques. 28. I notice on "Exhibit Blank for Bending Dies" that the inner face of the ears where they join the body is curved. Is that to prevent a cold shut when the ears are bent up?

Ans. 28. Not necessarily.

Ques. 29. Don't the curved shape tend to prevent a cold shut?

118 Ans. 29. It does not.

Ques. 30. Have not the defendants been compelled to throw away a great many formed up blanks which had "cold shuts" at the inner corner or corners of the ears, which were formed up from blanks having angular instead of curved faces, at the point in question?

Ans. 30. Not to my knowledge. They threw away a lot of shackles imperfectly forged.

Ques. 31. In what respect imperfectly forged?

Ans. 31. By having incompetent men. Some of the blanks would have a large corner on one side, and no corner at all on the other. The dies would someties get moved, thereby shortening or lengthening the back; some of them would be burnt so there would not be metal enough to make the blank perfect.

Ques. 32. Did any of them have "cold shuts"?

Ans. 32. Not to my knowledge.

Ques. 33. You do not, I suppose, wish to be understood as saying that it would be impossible to make a blank of the general form of Defendant's "Exhibit Clark's Old Shackle Blank," which could be formed up with sharp angles, although there was some trifling degree of curvature where the arms join the bent body.

Ans. 33. It can't be done and make a square corner.

Ques. 34. Why not? If there was a plenty of surplus metal in and throughout the bent back, and the curvature was very small indeed, why would not the surplus metal enter the corners of the former?

Ans. 34. Because the stock would draw out lengthways
119 instead of sideways. By sideways I mean towards the corners of the ears. It will draw lengthwise of the back.

Ques. 35. If by compulsion you compel the stock to go lengthwise, would there not be a tendency for it to go sideways at the same time?

Ans. 35. My observation is that the tendency of the iron is to draw lengthways of the back, without reference to the grain of the iron.

Ques. 36. Cannot you answer "Yes" to the previous question?

Ans. 36. I cannot answer it "Yes." If I must make a direct answer, I should say "No."

Ques. 36. Please examine "Exhibit Bending Dies Bent Blank"

and "Exhibit Blank for Bending Dies" at the places where the marks of the prick points are, and say if you find the metal drawn out lengthwise at those places by the operation of bending to which the first-named exhibit has been subjected.

Ans. 36. No, I do not at the corners; the side dies confine and hold the stock at that point; they are no wider than the dies upon which the blank is made.

Ques. 37. On the other hand, the prick punch marks have spread apart upon the bent up blank so as to be more than one-fourth inch apart (in a sidewise direction) than in the unformed blank. Is not that so?

Ans. 37. Yes.

Ques. 38. Is it not, then, perfectly plain that the spread of the metal at the points which are to form the corners is substantially all in the sidewise direction?

120 Ans. 38. It is not.

Ques. 39. Then why is there no difference in the width of the ears at the prick punch points, while there is a difference of from one-fourth to three-eights of an inch between the prick punch points in favor of the bent up shackle?

Ans. 39. As the stock is upset on the inside, in the process of bending, and is stretched on the outside, the corners being perfectly formed in the striking up die, any other surplus stock there is will draw lengthways of the back instead of sideways.

Ques. 40. I am not talking of any other surplus stock, but of that stock which is ultimately found in the square corners of the bent up blank. That stock is forced sideways, as you call it, but it is not forced lengthways by reason of the confining action of the die. Is it not so?

Ans. 40. I am not accustomed to making dies, and so cannot say about that.

Redirect:

Ques. 41. As you have been cross-examined as if an expert, though not introduced as such, I will ask you this question. Is it possible, in any form of bending dies you have ever seen, to strike up a shackle from a blank having rounded corners, substantially as shown in Complainant's "Exhibit Clark's Blank," and produce square and sharp outside corners upon the shackle?

(Objected to, on the ground of the incompetency of the witness, as indicated by his last previous answer.)

121 Ans. 41. It is not.

JOHN GARVIN.

Subscribed and sworn to before me, this 30th day of June, 1880.

CHARLES H. SHAW,
Notary Public.

Defendant offers in evidence certified copy of the file, wrapper, and contents, in the matter of application of James B. Clark for

letters patent, dated June 25, 1867, and numbered 66130, for improvement in the manufacture of blanks for carriage thill shackles.

Extract from Original Specifications.

Original specifications filed in the application of James B. Clark for a patent for improvement in the manufacture of blanks for carriage thill shackles, June 25, 1867, No. 66130, omitted as per amendment. * * * After having been formed between the dies, the arms *a* are bent up so as to stand perpendicular on the body, as shown in figure 3, the corners being still rounded. The shackle is next placed between two blocks, which rest against the outside of the arms *a a*, so as to prevent them from being spread or brought out of their perpendicular position, while a hammer is forced between the arms upon the curved body *b* of the blank, thereby making the same almost straight, and forcing the corners out, as shown in Fig. 4. These corners are then hammered down, and also the body and arms sufficiently straightened, until
122 the blank receives its final shape, which is indicated figure 5.

Stipulation.

Circuit Court of the United States, District of Connecticut.

JAMES B. CLARK
vs.
THE BEECHER MANUFACTURING CO. } In Equity.

It is stipulated and agreed between the parties in the above suit that the defendants are licensed to manufacture, use, and sell carriage shackle blanks under letters patent granted to Willis L. Smith, dated —, and numbered —.

MITCHELL & HUNGERFORD,
Of Counsel for Complainants.
O. H. & J. P. PLATT,
Of Counsel for Defendants.

Defendant's Exhibit, Burns' Patent.

No. 65641.

The United States of America to all to whom these letters patent shall come:

Whereas L. Burns, of Portchester, New York, has alleged that he has invented a new and useful improved die for forming thill couplings, he having assigned his right, title, and interest in
123 said invention to himself and Josiah Wilcox, of the same place, which he states has not been known or used before such invention; has made oath that he is a citizen of the United States; that he does verily believe that he is the original and first inventor or discoverer of the said invention, and that the same hath not, to the best of his knowledge and belief, been previously known or used;

has paid into the treasury of the United States the sum of thirty-five dollars, and presented a petition to the Commissioner of Patents praying that a petition may be issued therefor:

These are therefore to grant, according to law, to the said Burns and Wilcox, their heirs, administrators, or assigns, for the term of seventeen years from the eleventh dry of June, one thousand eight hundred and sixty-seven, the full and exclusive right and liberty of making, constructing, using, and vending to others to be used, the said invention, a description whereof is given in the schedule hereunto annexed, and made a part of these presents.

In testimony whereof I have caused these letters to be made patent, and the seal of the Patent Office to be hereunto affixed.

Given under my hand at the city of Washington, this eleventh day of June, in the year of our Lord one thousand eight hundred and sixty-seven, and of the Independence of the United States of America the ninety-first.

[SEAL.]

W. L. OTTO,
Acting Secretary of the Interior.

Countersigned and sealed with the seal of the Patent Office.

T. C. THEAKER,
Commissioner of Patents.

124 United States Patent Office.

LEANDER BURNS, of Portchester, New York, Assignor to Himself and JOSIAH WILCOX, of same place.

Letters Patent No. 65641, dated June 11, 1867.

Improved Dies for Forming Thill-Couplings.

The Schedule referred to in these Letters Patent and making part of the same.

To all whom it may concern:

Be it known that I, Leander Burns, of Portchester, in the county of Westchester and State of New York, have invented new and useful improvements in the "Manufacture of couplings for shafts or thills of carriages;" and I do hereby declare that the following is a full, clear, and exact description thereof, which will enable others skilled in the art to make and use the same, reference being had to the accompanying drawing, forming part of this specification.

The present invention relates to the manufacture of couplings for shafts or thills of carriages or other vehicles; and the invention consists in forming such couplings by striking or swaging them from a blank made of a suitable shape, in the first instance, and of the requisite size, but of one solid piece of metal in the series of dies, of proper form to impart to the blank the shape of an ordinary coupling for shafts of vehicles, as will be now described, reference being had to the accompanyiug plate of drawings, in which—

Figure 1 is a perspective view of the blank from which the coupling is to be made.

125 Figure 2, a plan view of the upper face of the lower die of that set in which the blank is first placed.

Figure 3, a plan view of the face of the upper die of the set of dies referred to in Fig. 2.

Figure 4, a vertical section taken in the plane of the line *x x*, Fig. 3.

Figure 5, a face view of the upper die of the next set of dies.

Figure 6, a face view of the lower die of the same set to that illustrated in Fig. 5, in connection with which die the coupling-blank is shown after being acted upon by said dies; and

Figure 7, a transverse vertical section taken in the plane of the line *y y*, Fig. 6.

Similar letters of reference indicate like parts.

A, in the drawings, represents the metal blank from which the shaft-coupling is to be made by striking it up in the dies, to be now particularly described. This blank A is made of one solid piece of metal, of the general shape shown in the drawings, which consists of a tail-piece, B, and cross-arm or head, C, in the latter of which there is to be a sufficient quantity of metal that when struck up in the dies the requisite shaft-coupling may be produced. D and E, the upper and lower dies of the first set of dies, the lower one of which dies is bored out through its center at F, with its surface cut away or out upon opposite sides of such bore, to an equal extent, depth, shape, and size, as shown at G in the drawings, corresponding to which cut-out portions of the lower die the face of the upper die is also cut, so that when the two dies are brought together,

126 face to face, a space or opening, H, will be formed or left, of a shape suitable to allow that portion or those arms of the shaft-coupling which, when properly bent, form the eye between which the thill-iron is to be hung by a centre bolt or other suitable pivot or means to be produced from the blank placed in the dies, and there struck up, the upper die being cut through its centre to accommodate the tail end of the blank. After the coupling-blank has been struck up in the dies D and E, as above described, it is then placed in the next set of dies M N for the purpose of preparing the arms of the coupling to be bent to form the eye for hanging the thill-bar to it. These dies, upon their two faces in contact with each other, are so cut out as to impart to or throw up the said blank or coupling-arms into square corners L, as shown in Fig. 7, so that if then bent up at right angles to form the eye desired, perfect square corners will be left, with the metal through such corners and the other portions of the eye of a uniform thickness, these arms being bent up in a direction toward each other.

In conclusion, it may be here remarked that in lieu of using the last set of dies the desired bend or shape may be given to the arms of the coupling blank by the old method or means; this invention consisting in the making of the coupling from a solid blank or piece of metal, which, being subjected to the action of suitable dies, whether more or less in number, is brought into the proper shape for use, the bending of the blank to produce the square shoulders where bent

constituting the subject of a separate application for letters patent bearing even date herewith.

The rounded portion of the blank which is forced into the
127 hole F in the primary die E, in the process of swaging, is provided with a screw thread upon which a nut is screwed, and forms a safe and complete means of attachment to the vehicle.

I claim as new, and desire to secure by letters patent—

1. The thill coupling, constructed as described by swaging the blank A in the dies D E and M N, as herein shown and described, for the purpose specified.

2. The dies D E, provided with the holes F and opening H, the dies M N with equal shoulders L, all constructed as described for the purpose of forming the thill coupling, substantially as herein set forth.

LEANDER BURNS.

Witnesses:
SAMUEL WILCOX.
GEO. E. WILCOX.

DEFENDANT'S EXHIBIT, REISSUE THORP PATENT.

No. 2362.—Reissue.

United States of America.

To all to whom these letters patent shall come:

Whereas H. D. Smith, G. F. Smith, and Edward W. Twichell, of Plantsville, Connecticut, assignees of James P. Thorp, have alleged that said James P. Thorp invented a new and useful improve-
128 ment in wagon shaft shackle (for which letters patent were issued to him, dated May 1, 1860, which letters having been surrendered by said assignees, the same have been cancelled, and new letters ordered to issue to them on an amended specification), which he stated had not been known or used before this application; had made oath that he was a citizen of the United States; that he did verily believe that he was the original and first inventor or discoverer of the said improvement, and that the same hath not, to the best of his knowledge and belief, been previously known or used; said assignees having paid into the Treasury of the United States the sum of thirty dollars, and presented a petition to the Commissioner of Patents signifying a desire of obtaining an exclusive property in the said improvement, and praying that a patent may be granted for that purpose:

These are therefore to grant, according to law, to the said H. D. and G. F. Smith and Edward W. Twichell, their heirs, administrators, or assigns, for the term of fourteen years from the first day of May, one thousand eight hundred and sixty, the full and exclusive right and liberty of making, constructing, using, and vending to others to be used the said improvement, a description whereof is given in the words of the said H. D. and G. F. Smith and Edward

W. Twichell in the schedule hereunto annexed, and is made part of these presents.

In testimony whereof, I have caused these letters to be made patent, and the seal of the Patent Office has been hereunto affixed.

Given under my hand at the city of Washington, this eighteenth day of September, in the year of our Lord one thousand eight hundred and sixty-six, and of the Independence of the United States of America the ninety-first.

[SEAL.]

W. J. OTTO,
Secretary of the Interior.

Countersigned and sealed with the seal of the Patent Office.

T. C. THEAKER,
Commissioner of Patents.

The schedule referred to in these letters patent and making part of the same.

To all persons to whom these presents shall come:

Whereas James P. Thorp, of Plantsville, in the county of Hartford, and State of Connecticut, did make a new and useful invention having reference to carriage shaft connections or shackles, and did apply for and obtain a patent on such, the said patent being numbered 28114, and bearing date the first day of May, in the year one thousand eight hundred and sixty; and whereas all the exclusive property in such invention and patent has been duly conveyed to us, H. D. Smith and Company, of said Plantsville; and whereas, by an insufficient and defective description and specification, the said patent is believed to be invalid and inoperative, and we have applied for a reissue of it to correct such error or errors: We do hereby declare the invention to be fully described in the following specification, and represented in the accompanying drawings, of which—

Figure 1 is an under side view, and

Figure 2, a transverse section of a carriage shaft shackle blank, made in accordance with the invention of the said Thorp, and by means of a die, as hereinafter described;

Figure 3 is a top view;

Figure 4, a transverse section; and

Figure 5, a longitudinal section of the said die.

Figures 6 and 7 will be hereinafter referred to and explained.

Figure 8 is a top view of a blank as it was usually made before the date of the invention of the said Thorp.

The nature of the said invention of the said Thorp consisted in a carriage thill or shaft shackle blank, constructed with projections arranged at the junction of its arms and body, and for the purpose of not only giving strength to the blank at the parts where are the bends of the arms, but enabling such bends to be formed with what are usually termed square corners.

And the nature of the invention of the said Thorp further consisted in a die for making such blanks, such die being constructed with recesses or cavities for the formation of the aforesaid projections, the

whole being substantially as hereinafter explained and as represented in the accompanying drawings.

The old mode of making the blank or swaging it in a die, and which we do not claim as the invention of the said Thorp, caused its arms, where bent up into parallelism with each other and at right angles with the body of the blank, to be curved at the outer surfaces of the bends, in manner as shown at *a a* in figure 6, in which
131 A A represent the arms, and B the body of the blank.

The invention of the said Thorp causes the blank, after its arms are bent up, to have the form shown in figure 7, whereby the projections, combined with the blank, cause it to be formed with square or right angular corners, or parts *a a*, whereby the blank is rendered much stronger at the junctions of the arms and body, and the expansion of metal which takes place in bending the arm is compensated for by a diagonal contraction of the metal, the same operating to prevent the destruction of the cohesion of the particles of the metal, and the consequent weakening of the blank at the parts where it is bent.

The blank as usually made is cruciform, and the die for swaging such blank into form has a correspondingly shaped cruciform matrix, which is shown at C, as made in a block E of metal (see figures 3, 4, and 5.)

This die is also formed with protuberances *b b*, for making the depressions to include the places for drilling the bolt holes in the arms.

The improved blank when formed has two projections *d d*, arranged at or about at the junctions of the arms A A with the body B, the positions of these projections or their form being substantially as exhibited in figures 1 and 2 of the drawings.

The die has depressions or cavities *e e* made in it, as shown in figures 3 and 4, such being for the formation of the projections *d d*. These depressions or cavities are arranged with, at or near the junction of those parts of the die which form the body and arms
132 of the blank. We would observe that in using the die the metal is to be pressed or forced into it by powerful pressure brought to act on the metal by any well-known means, such as are generally employed in swaging metal in and by a die.

Great advantages result in the construction of the blank and its die according to the invention of the said Thorp, as the blank can be completed and finished at less expense and is much stronger, and is not so liable to break as in an ordinary blank, under the great and peculiar strain to which it is subjected while in use.

It is very important that the shaft connection should be strong at the junction of the arms with the body of the blank, for, if not so, it, when in use, may part and put in jeopardy valuable lives and property.

We claim as the invention of the said Thorp the following:

The improved manufacture of carriage shaft shackle blank, constructed with the projections *d d* arranged at or about at the junctions of the arms and body of the blank, substantially as and for the purpose specified.

Also for making the said blank, the die as constructed with the projection forming recesses, arranged with respect to the portion for swaging the body and arms of the blank, substantially in manner as specified.

H. D. SMITH,
GEORGE F. SMITH,
EDWARD D. TWICHELL,
Alias H. D. Smith & Co.

Witnesses:
L. H. NORTON.
SARAH E. NORTON.
Ex'd F. F., L. M.

133 And on the 29th day of November, 1880, the said cause was fully argued before said circuit court by counsel for the respective parties. And on the 15th day of February, 1881, the following opinion of court was filed therein, viz:

134 Circuit Court of the United States for the District of Connecticut.

JAMES B. CLARK
vs.
THE BEECHER M'F'G COMPANY & D. F. SOUTHWICK.

SHIPMAN, J.: This is a bill in equity based upon the alleged infringement of letters patent granted to the plaintiff on June 25th, 1867, for an improvement in blanks for carriage thill shackles. The important question in the case is that of infringement.

"The invention is for an improvement in the manufacture of the article known to the trade as 'carriage shackles' or 'thill couplings,' that is to say, in the device by which the pole or thills of a carriage are hinged to the axle. The invention relates particularly to that class of shackles which consists of a horizontal plate with a pair of vertical ears rising therefrom, between which the eye
135 of the thill iron is hinged. The flat or body part of the article is forged with a projection at each side, forming what is commonly called the 'clip,' by which the article is secured to the axle." It is necessary, in order to make a salable article, that the corners of the back or flat portion of the shackle shall be sharp and well defined. If the ears of the blank are simply bent from the body at right angles, the outer corners will be rounded by means of this bending.

Before the plaintiff's invention two different methods of forming the blank were used. One was to prepare the blank with projections of metal at the points where the angles were to be formed, so that when the bending took place this surplus would fill out the corners with sufficient material to make a sharp right angle. This method is shown in the patent to James P. Thorp of May 1st, 1860. The second plan was to form both the angles in the blank and the back before the bending took place, and then to straighten the arms with-

out changing the shape of the back or of the angles. This
136 plan is shown in the patent to L. Burns, of June 11th, 1867.

The plaintiff's invention was for the purpose of avoiding the troublesome projections of the Thorp patent, which made the bending a laborious work. The central part of the body of the Clark blank was curved, and the obliquely bent arms of the blank were also rounded where they joined the central curved body, the curve of these arms being the reverse of the curve of the body. When this blank was put into a bending die, in which the arms were held by clamping mechanism, the blow of the hammer upon the curved back "upset" the surplus metal in the curved portion, forced it right and left towards the rounded corners so as to fill up any deficiency of metal which might be caused by bending the arms and to form sharply defined right angles. The invention was a blank having a curved body, whereby surplus metal was provided by the process of "upsetting," for the formation of sharp angles at the points where rounded or curved or equivalent formed arms join the central portion of the body, and are bent into
137 the ears of the shackle. The specification says: "The blank, which is made in the shape of a cross in the usual manner, is placed upon the lower die A, and the upper die B is then forced down upon it, whereby the arms *a a* of the blank are bent into an oblique direction, and the body *b* is curved, as shown in the figure. The portion of the blank where the arms join the body is rounded, as shown on both the inside as well as on the outside, the straightening of the body of the shackle pushing out sufficient material for forming the sharp corners without having any hindersome or impractical projections. The dies are formed so as to give to the blank the required shape."

The claims are—

1. The carriage shaft shackle blank, so formed between dies that the body *b* of the blank is curved, substantially as herein shown and described.

2. The dies A and B, for making the said blanks, when so constructed and arranged as to form the rounded corners and the
138 curved body of the said blank, substantially as herein shown and described.

Julius B. Savage, of Southington, was a licensee under the patent, and is apparently the only person who has made the blanks shown in the drawings. At his shop changes were gradually made in the shape of the blank, first, by enlarging the upper die at the junction of the arms with the body, so as to furnish more metal at that point. Afterwards, by straightening the arms and making their angles more definite, until finally the arms were in the same plane with each other, and the angles were sharply defined. Subsequently Willis B. Smith, a foreman in Savage's shop, obtained a patent for the blank which the defendant manufactures. The body or back of the blank is not straight; the straight part of the body is connected with the arms by two angular bends; the arms are in the same horizontal plane with each other and are parallel with the body, and the obtuse angles at their junction with the body are

clearly defined. The defendant's blank has neither rounded
139 corners nor a curved body. The back is to be straightened, and the arms are to be bent in a bending die in the same manner that these operations are performed upon the plaintiff's blank.

It thus appears that the shape of the two blanks is different. One consists of a series of curves, the other consists of a series of angles. The question of infringement does not depend upon the form of the respective articles. If the straightening of the angularly bent back of the defendant's blank pushes surplus metal towards the corners, so that, by means of this surplus, sharp, instead of rounded, angles are formed when the arms are bent, then the modification of shape is immaterial. If, on the other hand, the angles are already formed of such shape and so definitely that no surplus material is needed or is furnished to the angles, but the straightening of the back merely forces existing angles further apart without a displacement of the material at the angles, then the two blanks are constructed upon a different principle.

140 The plaintiff insists that the defendant's back is upset so as to "push out" metal into the corners, whereby full and square angles are made, as in the Clark device. The defendant's position is that when the back of its blank is straightened and the arms are bent, no stock is forced out to fill the angles, because they are already formed, but that these "defined angles have been forced from each other by driving surplus metal between them." It is agreed that the angles, after the arms are bent, are one-fourth of an inch further apart than they were before the bending. The theory of the defendant, as stated by its expert, is this: "There can be no pushing out of the metal toward the angle, because there is already as much more metal in the vicinity of the angle than is required there, as the angle is greater than a right angle; therefore, instead of the surplus metal being pushed toward the angle, it must be pushed away from the angle, and toward the center; it cannot be pushed toward the angle, because the angle, having already
141 too much metal near it, more cannot be pushed there; the bringing the upper portion between the ears into a straight line contracts that portion, and forces the metal down into the center, and so as to produce the necessary elongation of the back between the two previously formed sharp corners."

I am of opinion that the defendant's theory is the one which is better sustained by the testimony and the tests than the other, and that in the defendant's blanks there is no substantial upsetting of surplus of metal, so as to form sharp angles. The surplus metal is used in the elongated back, and not in the angles. It follows that infringement has not been proved, and that the bill should be dismissed.

Charles E. Mitchell, for the plaintiff.

Orville H Platt, for the defendant.

142 And on the 1st day of July, 1881, the complainant filed petition for reargument, in the words and figures following, viz:

143 Circuit Court of the United States, District of Connecticut.

JAMES B. CLARK
v.
BEECHER MANF'G CO. } In Equity.

To O. H. & J. P. PLATT, Esqs., *Defendants' Solicitors:*

SIRS: Take notice that we shall move the court on the first Monday of July, 1881, or as soon thereafter as counsel can be heard, for permission to reargue the above entitled cause, and for such other and further relief as to the court shall seem equitable.

Said motion will be based upon the following among other grounds:

1. That the court erred in saying that "the obliquely bent arms of the blanks were also rounded where they joined the central curved body," and it will be claimed in this connection that the arms of the Clark blank are straight as in the defendants' blank, and that in the Clark blank and the defendants' blank alike the "body
144 *b*" is curved, and "the portion of the blank where the arms join the body is rounded," while the arms themselves, in both blanks, are straight. And the same will be claimed as to all the passages in the opinion filed in said cause in which the "arms" are described or referred to as rounded or as otherwise than straight.

2. That the court erred in ascribing the straightening of the arms to a change made at the shop of Savage, and in this connection it will be claimed that the arms of the Clark blank have always been, and in the drawing of the patent were represented as being, straight.

3. That the court erred in saying that the defendants manufacture the Smith blank, and in this connection it will be claimed that the defendants have dropped the square corners which characterize the Smith blank, leaving the blanks so shaped as to depend for forming the square corners upon the effect of straightening the blank, and thereby pushing out surplus metal furnishing.

4. That the court erred in saying that "defendants' blank has neither rounded corners nor a curved body," if by such lan-
145 guage it was meant that the defendants do not have full equivalents for the round corners and curved backs of the Clark blank. In this connection it will be claimed:

(1.) That defendants' blank has full equivalents for both of said parts.

(2.) That it is immaterial whether the corners are rounded or not, provided the back is curved or has an equivalent construction.

5. That the court having held that "if the straightening of the angularly bent back of defendants' blank pushes surplus metal toward the corners, so that by means of the surplus sharp instead of rounded angles are formed when the arms are bent, then the modifications of shape are immaterial," should have decided for the

complainant; and in this connection it will be claimed that "the angularly bent blank of the defendants is so constructed that the straightening of the body of the shackle pushes out sufficient metal for forming the sharp corners without having any hindersome and impractical projections."

That the court erred in holding "that in defendants' blank
146 there is no substantial upsetting of surplus metal so as to form sharp angles;" and it will be claimed that the square angles of the bent-up blank are produced by the straightening of the metal pushing out sufficient material for forming the sharp corners; and it will be claimed that but for this effect of straightening the metal of the bent blank no sharp corners would be produced.

6. That the court erred in holding that "the surplus metal is used in the elongated back and not in the angles;" and in this connection it will be claimed that the back is not elongated, but, on the contrary, is shortened in its average length, the elongation of one side being very much less than the shortening of the other side, so that the metal displaced by the general shortening of the back must push out, and does push out, so as to furnish material for forming sharp corners.

7. That the court erred in sustaining the rim expressed by Mr. Earle in the passage quoted from his testimony; and in this connection it will be claimed that Mr. Earle was mistaken in
147 saying "there can be no pushing out of metal toward the angle, because there is already as much more metal in the vicinity of the angle than is required there, as the angle is greater than a right angle;" and in this connection it will be claimed that the statement is an error, and the reason given a fallacy, because the angle which the process furnishes material for making is the square and sharp angle which joins the ear and back of the completed blank, and not the obtuse angle which joins the arm and the angularly curved back of the process blank; and it will be claimed further, that if the reason given by Mr. Earle is a valid one, then a straight blank is better equipped than either for furnishing material for sharp corners, since it has more metal than an obtuse angle upon either side of any line where it may be chosen to bend it; and it will be further claimed that the metal surrounding an obtuse angle cannot be crowded into a rigid angled matrix without pushing out metal toward the angle which is to be made; and it will be claimed that Mr. Earle was further
148 mistaken in adding "instead of the surplus metal being pushed toward the angle it must be pushed away from the angle and toward the center;" and it will be claimed in this connection that this quoted passage admits that the square corners are not complete, but must be made complete by an operation, and then describes this operation as pushing the metal away from the corners, as if jamming red hot metal into a square matrix, or a matrix with square corners low worked that way; and it will be claimed that Mr. Earle is in error in saying of the metal "it cannot be pushed toward the angle, because the angle, having already too much metal near it, more cannot be pushed there and in this connection it will

be claimed that the angle of the defendants' blank no more has too much metal than does the bent angle of the Clark blank; if there is a surplus in an obtuse angle there is a greater surplus in an obtuse bend; that Mr. Earle is led astray by confounding the
149 obtuse angle of the process blank with the sharp square angle of the bent up blank, the fact being that the sharp square angle is formed by building out metal from what would be the exterior face of the bent up blank near the corners in the matrix if there were no surplus metal in the bent back; that Mr. Earle is mistaken in adding "the bringing of the upper portion between the ears into a straight line contracts that portion and forces the metal down into the center, and so as to produce the necessary elongation of the back between the two previously formed angles;" and in this connection it will be claimed that the bringing of the portion between the arms into a straight line, not only elongates the outside of the back, but furnishes enough additional metal to build out the square sharp corners of the bent up blank.

Wherefore, and for other reasons to be assigned at the hearing, the honorable court will be asked to grant the plaintiff's prayer for a rehearing, and for such other and further relief as may
150 pertain to equity and justice.

By MITCHELL & HUNGERFORD,
Solicitors.

Service accepted.

JAMES P. PLATT,
Of Counsel for Def't.

And on the 12th day October, 1881, the said petition came on for argument, and was argued by the plaintiff for himself, and by J. P. Platt, Esq., for defendants, and on the 16th day of December, 1882, the court filed an opinion, in the words and figures following, viz:

151 Circuit Court of the United States for the District of Connecticut.

JAMES B. CLARK *v.* BEECHER M'F'G CO. *et al.*

SHIPMAN, J.:

I have carefully examined the plaintiff's brief upon his motion for a rehearing, and my views, as previously expressed in writing, remain unchanged, except that the re-examination of the case leaves me more thoroughly convinced than before that the defendants do not infringe.

As I have already written an opinion in which my views are succinctly stated, I do not deem it necessary to write again at length. I think that the plaintiff's theory, although it is a satisfactory one on paper, is not sustained by the facts.

The motion is denied.

152 And on the 16th day of February, 1882, the complainant filed petition for rehearing, in the words and figures following, viz:

153 Circuit Court of the United States, District of Connecticut.

JAMES B. CLARK
v.
BEECHER MAN'F'G CO. } In Equity.

To O. H. & J. P. PLATT, Esqs., *Defendants' Solicitors.*

SIRS: Take notice that I shall move the court on the third Monday of February, 1882, at ten o'clock a. m., or as soon thereafter as counsel can be heard, for permission to reargue the above cause, and for such other and further relief as to the court shall seem equitable.

Said motion will be based upon the following among other grounds:

It will be held that [the] court erred in saying that "there can be no pushing out of the metal toward the angle, because there is already as much more metal in the vicinity of the angle, as the angle is greater than a right angle, therefore instead of the surplus metal being pushed toward the angle, it must be pushed away from the angle," because this statement, which would *would* require the
154 axis of motion of the metal in bending to be at the point of the angle at the side of the bar from which the bend is made in converting the obtuse angle into the right angle, requires that the iron shall act in bending directly contrary to the law of action which governs in the bending of heated or cold iron, because much more force is required to compress wrought iron than is required to extend it. So that metal is supplied to the angle in converting a greater angle into a less is capable of mathematical demonstration.

And in converting an angle of 130 or 140 degrees (like that shown in Defendant's Exhibit Blank for Bending Dies) into the sharp right angle of the finished shackle, the amount supplied to the corner in the vicinity of the outer angle is nearly one-eighth of the square of the thickness, multiplied by the width, to which must be added the amount supplied to make up for the shrinkage from bending, which will increase the amount supplied to more than one-sixth, which is about one-half tho amount needed to convert the straight blank into the sharp right-angled corner.

155 But in order that no metal shall be supplied to the angle, and that the metal shall be pushed away from the obtuse angle in forming the right angle, it would be necessary that the resistrnce of the metal to extension should be overwhelmingly greater than the resistance to compression, which is contrary to scientific authority and the experience of practical mechanics.

Wherefore, and for other reasons to be assigned at the hearing, honorable court will be asked to grant the plaintiff's prayer for a rehearing and for such other and further relief as may pertain to equity and justice.

By JAMES B. CLARK,
For Plaintiff.

COUNTY OF NEW HAVEN, *ss:*

MERIDEN, *February 13th*, 1882.

Then and there I made service of the within and foregoing com-

plaint, petition, and notice, by leaving a true and attested copy of the same at the usual places of abode of the within-named O. H. Platt and also the within-named James P. Platt.

Attest: LINUS BIRDSEY,
Deputy Sheriff.

Fees:

Travel to serve and return	2 50
Service	24
Copies	2 00
Endorsements	36
	$5 10

156 And on the 20th day of February, 1882, said petition came on for hearing and was argued by plaintiff for himself and by J. P. Platt, Esq., for defendants, and thereupon it was ordered and decreed by the court that said motion be denied.

157 And on the 20th day of February, 1882, the following final decree was made and entered in said cause, viz:

Circuit Court of the United States for the District of Connecticut.

At a term of the circuit court of the United States of America for the district of Connecticut, held at the city of Hartford, in said district, on the 20th day of February, in the year of our Lord one thousand eight hundred and eighty-two.

Present: The Honorable Nathaniel Shipman, district judge.

J. B. CLARK *v.* THE BEECHER M'F'G CO. and another.

This cause came on to be heard upon the bill of complaint herein, the answer thereto, and replication to such answer, and the proof taken and filed in said cause, and having been argued by counsel for the respective parties:

Now, therefore, on consideration thereof it is ordered, adjudged, and decreed, and the court doth hereby *hereby* order, adjudged, and decreed as follows, viz:

That the complainant's bill of complaint be, and the same is hereby, dismissed with costs to the defendant, to be taxed.

N. SHIPMAN, *Judge.*

158 I, Edwin E. Marvin, clerk of the United States circuit court for the district of Connecticut, do certify that the foregoing is a true return of the record in said court in the cause of James B. Clark *v.* The Beecher Manufacturing Company.

In witness whereof, I have set hereto my hand and the seal of said court, at Hartford, in said district, this 31st day of May, A. D. 1882.

E. E. MARVIN, *Clerk.*

Endorsed on cover: Connecticut C. C. U. S. No. 259. James B. Clark, appellant, *vs.* The Beecher Manufacturing Company and D. F. Southwick. Filed August 22d. 1882.

Office Supreme Court U. S.
FILED.
APR 9 1885
JAMES H. McKENNEY.
CLERK.

115-79

Supreme Court of the United States.

JAMES B. CLARK, APPELLANT,

vs.

THE BEECHER MANUFACTURING COMPANY,
AND D. F. SOUTHWICK.

COMPLAINANT'S BRIEF.

United States Supreme Court

IN EQUITY.

JAMES B. CLARK,
(Complainant and Appellant.)

vs.

THE BEECHER MANUFACTURING COMPANY,
(Respondent and Appellee.)

APPELLANT'S BRIEF.

EXPLANATORY.

This suit is brought for the infringement of James B. Clark's letters patent for improvement in Shackle-Blanks, No. 66,130, dated June 25, 1867. The specification of that patent is as follows, and a copy of the drawing is annexed.

SPECIFICATION.

To all whom it may concern :

Be it known that I, James B. Clark, of Plantsville, in the county of Hartford, and State of Connecticut, have invented a new and useful improvement in Shackle-Blanks; and I do hereby declare that the following is a full, clear, and exact description thereof, which will enable others skilled in the art to make and use the same, reference being had to the accompanying drawings, forming part of this specification.

This invention relates to the construction of carriage-shaft shackle from solid blanks, and to the shape of the dies for forming the same, so that with the least amount of labor and power, the said shackle may

be gradually formed into the required shape. In the annexed drawing this invention is illustrated.

Figure 1 is a vertical sectional view of a shackle-blank, showing it between the dies.

Figure 2 is a top or plan view of a shackle-blank, as the same is formed by the dies.

Similar letters of reference indicate like parts.

The blank, which is made in the shape of a cross in the usual manner, is placed upon the lower die *A*, and the upper die *B* is then forced down upon it, whereby the arms *a a* of the blank are bent into an oblique direction, and the body *b* is curved, as shown in the figure. The portion of the blank, where the arms join the body, is rounded, as shown on both the inside as well as on the outside, the straightening of the body of the shackle pushing out sufficient material for forming the sharp corners without having any hindersome and impractical projections. The dies are formed so as to give to the blank the required shape.

This process of forming shakle-blanks has proved by practice to be the most expeditious and simple yet performed, as it requires the least amount of machinery, and forms each part of the shackle with the required amount and thickness of metal for completing the article.

What I claim as new, and desire to secure by letters-patent, is—

1. The carriage-shaft shackle-blank, so formed between dies that the body *b* of the blank is curved, substantially as herein shown and described.

2. The dies *A* and *B*, for making the said blank, when so constructed and arranged as to form the rounded corners and the curved body of the said blank, substantially as herein shown and described.

Witnesses: JAMES B. CLARK.
SIMEON H. NORTON,
DANIEL WALKER.

THE ISSUE. The sole defense is that the defendant does not infringe. There is an allegation in defendant's answer that complainant's patent is anticipated by two prior patents, but only one of those patents was offered in evidence by defendant, and that simply as an illustration of the prior art, bearing upon the construction to be given

to complainant's patent; so that the inquiry in the court below and in this court is confined simply to the question of infringement.[1]

COMPLAINANT'S PATENTED IMPROVEMENT relates to a single step in a process for the production of carriage-thill shackles. The complete article is shown in the drawings below.

---

[1]The utility of the complainant's patented improvement is well evidenced not only by defendant's willingness to expend a large sum of money in litigation rather than give up its practice of this improvement, but also by the testimony of Willis B. Smith, defendant's patentee, showing that complainant's improvement went into use through J. B. Savage, complainant's licensee, in 1867, the year complainant's patent was granted, and that twenty-five thousand pairs of shackles per year were made under complainant's patent by this licensee.

W. B. Smith's testimony:

×-Int. 23. Then if I understand you, from 1867 to 1871, Clark's blanks, under various modifications, were made at J. B. Savage's, but all the modifications had the bent back feature. Am I right?

Ans. Yes, sir.

×-Int. 34. How many straight eared shackles did Savage make between the year 1867 and 1871; of the Clark kind I mean, as nearly as you can estimate?

Ans. We probably made about twenty-five thousand pairs a year; probably one half made in Clark dies.

The history of the getting up of this so-called improvement is suggestive. Defendant's patentee, said W. B. Smith, worked for said Savage from 1867 on complainant's patented blanks. In 1870 Smith took the patent under which defendant now assumes to work. In 1871 Savage assumed to reject complainant's patent and to begin work under the said Smith patent. Defendant bought half of the said Smith patent.

W. B. Smith's testimony:

×-Int. 1. Was J. B. Savage a licensee under the Clark patent?

Ans. I don't know whether he owned the patent. He paid a royalty under it.

×-Int. 23. Then if I understand you, from 1867 to 1871 Clark's blanks under various modifications were made at J. B. Savage's, but all the modifications had the bent back feature. Am I right?

Ans. Yes, sir.

×-Int. 24. And you worked at shackle-forging for Savage during all that time?

Ans. Yes, sir.

×-Int. 25. You are the patentee of the letters-patent No, 126,225, dated August 9, 1870, under which the defendant claims to make shackle-blanks?

Ans. Yes, sir.

×-Int. 26. And you were at work upon the Clark blanks when you applied for that patent?

Ans. I was.

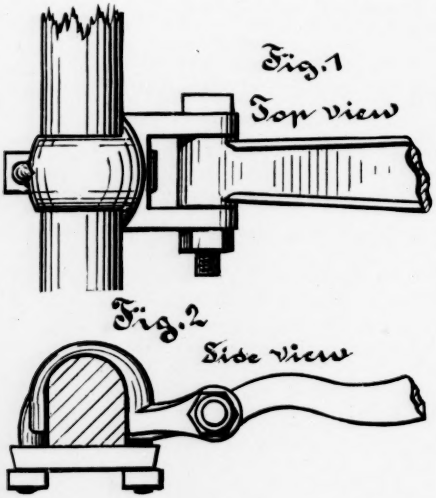
R. D.-Int. 42. Did Mr. Savage stop making shackles entirely in 1871?

Ans. He did not.

R. D.-Int. 43. How did he make them after 1871?

Ans. He made them after my pattern.

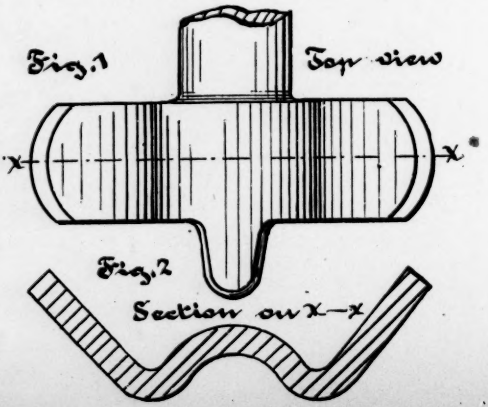
PLAINTIFF'S EXHIBIT MOUNTED CARRIAGE SHACKLE.



The improvement in question does not relate to the *whole* process of producing a carriage-shackle, but to a *single step* therein. The beginning of the whole process is the production of a blank in the shape of a cross—a cruciform blank.

The cruciform blank just referred to is an unpatented thing, so far as the present case is concerned. Complainant's invention takes said cruciform blank and in dies converts it into the shape shown in the next figures of drawing.

COMPLAINANT'S PATENTED BLANK.



Complainant's patented invention consists in this blank just shown, and in dies for producing the same from said cruciform blank. The patented blank shown in the last drawing is, in other dies, converted into the shape shown in the next drawing.

PATENTED BLANK—AFTER FORMING UP.

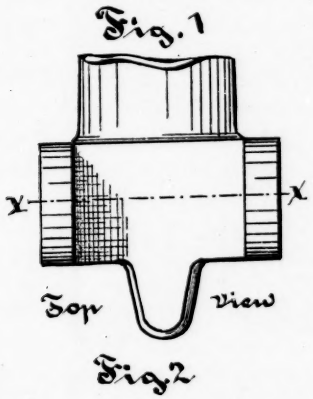
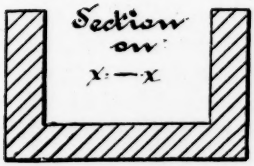


Fig 2

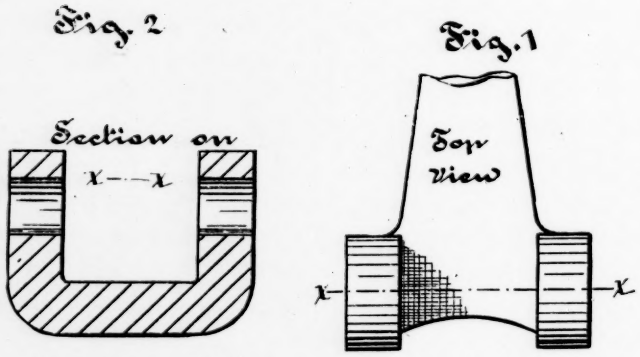


The blank shown in the last drawing and the dies for making it from the patented blank, are unpatented matters so far as this present case is concerned, but the patented blank is made with direct reference to the production of the blank shown in the last drawing, and with direct reference to giving the back or body [that part of the blank between the two ears] a sufficient amount of stock to fully form the back of the blank shown in the last drawing from outer angle to outer angle. The production of the blank shown in the last drawing with straight back from outer angle to outer angle, is *the* thing which complainant's improvement aims at; and in order to understand the character and scope of complainant's patented invention we will at this point illustrate—

THE PRIOR ART.

The original and rude form of a carriage shackle-blank is shown in the following drawing.

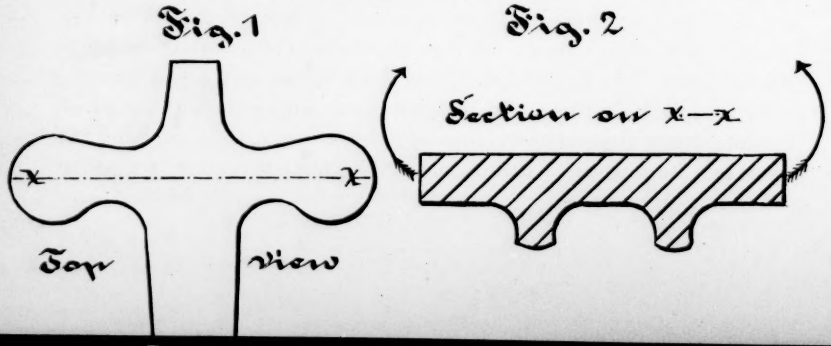
OLD STYLE SHACKLE.



The carriage shackle-blank shown in the last drawing is formed by bending up the two ears in the simplest and most obvious way from a blank of plate metal of substantially uniform thickness, and the result is that where there should be two outer corners square and sharp such portions are left rounded, shortening, by just so much, the bearing of the shackle on the axletree, creating a serious defect. The existence and character of this defect is admitted by both parties to the present controversy and needs no further mention.

The next step in the prior art was the production of a blank such as is shown in the next following drawing, and the same was patented in the patent to J. P. Thorp, No. 28,114, dated May 1, 1860.

BLANK OF THORP PATENT.

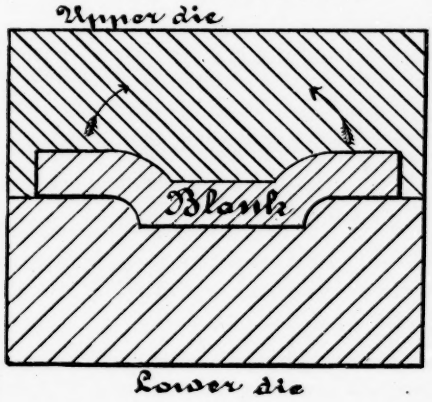


The two projections seen upon the bottom of the blank shown in the last drawings, are intended to furnish the metal sufficient for making the outer corners of the shackle square and sharp when the ears are bent upward, as indicated by the arrows.

The third step in the prior art is illustrated in the patent of L. Burns, No. 65,641, dated June 11, 1867. Mr. Burns, by the use of a variety of dies, assumes to produce the blank shown in the next following drawings, with the outer corners formed square and sharp before the ears are bent up, the bending being in the direction indicated by the dotted lines. There is perhaps no positive evidence with reference to the success of the Burns invention, but it is tolerably evident from the evidence on both sides that the Burns process and dies are not practical affairs. Be that as it may, however, they are not the thing in dispute.

BLANK OF BURNS PATENT.

DIES WITH BLANK THEREIN.



LET US BRIEFLY RECAPITULATE the prior art and see what it contains. It contains, *first*, the old style shackle, made from a plate of substantially uniform thickness, with the ears bent up in the simplest way, leaving the outside corners badly rounded, and creating a serious defect not to be tolerated. It contains, *second*, the attempt to cure this difficulty, of the rounded corners, in the blank of the Thorp patent, by forming projections or enlargements on the blank

at the points which are to finally form the outside corners of the shackle. It contains, *third*, the devices of the Burns patent, assuming to form both the inside and outside corners of the shackle, complete and perfect, before the ears are bent up, involving the use of a great variety of dies; and never susceptible to reduction to practice.

SCOPE OF COMPLAINANT'S PATENTED IMPROVEMENT.

Now we come to complainant's patented improvement, the practice of which makes it possible to use a blank of substantially uniform thickness throughout, and by the use of only two sets of dies, produce a perfect shackle-blank. In view of the prior art the invention consists in a shackle-blank of substantially uniform thickness (to use the words of the patent, "without any hindersome or impractical projections,") having the body or back (that is, the portion between the parts which are to finally form the ears) disposed out of a straight line, so as to give that back such an amount or excess of metal that in the final operation there will be metal enough for a back straight and flat from end to end.

In view of the prior art, this is a proper definition of complainant's patented improvement: in plain, common terms the patented improvement consists in using a shackle-blank having an excess of metal given to the back by disposing that metal out of a straight line.

THE INVENTION AS CLAIMED. Having ascertained in what the patented improvement really consists, let us see if the claim in complainant's patent can be reasonably construed to protect that invention as just defined. That claim is:

"1. The carriage-shaft shackle-blank so formed between dies that the body *b* of the blank is curved, substantially as herein shown and described."

"2. The dies *A* and *B*, for making the said blank, when so constructed and arranged as to form the rounded corners and the curved body of the said blank, substantially as herein shown and described."

It would seem to be clear and plain that the first claim of the patent in suit is broad enough, by its terms, to cover and include that invention which is shown by the prior art to be that of com-

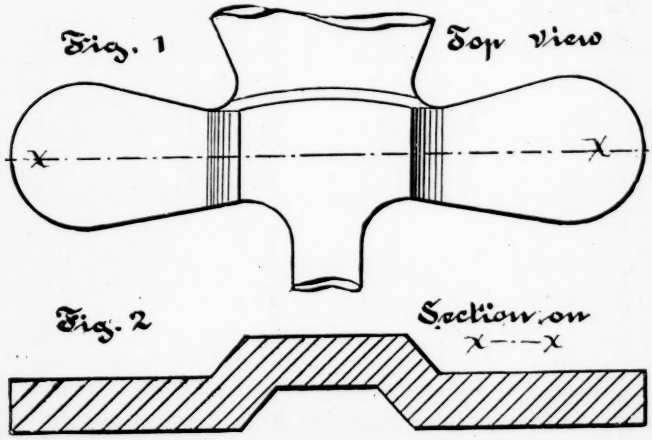
plainant, to wit, a carriage shackle-blank having an excess of material in the body or back, attained by disposing the metal in that part out of a straight line. It is true that the first claim of complainant's patent mentions the body or back of the blank as "curved," but manifestly any mere change of form in the body or back of the blank, which leaves it with said excess of metal, is *merely* a change of form and nothing more.

The second claim of the patent in suit might seem, by its terms, to be somewhat more limited than the first claim because it mentions the "rounded corners" as well as the "curved body" of the said blank, all mention of such "rounded corners" being absent from the first claim; and that difference between the two claims will be briefly discussed when we reach a more specific consideration of the second claim.

DEFENDANT'S INFRINGEMENT.

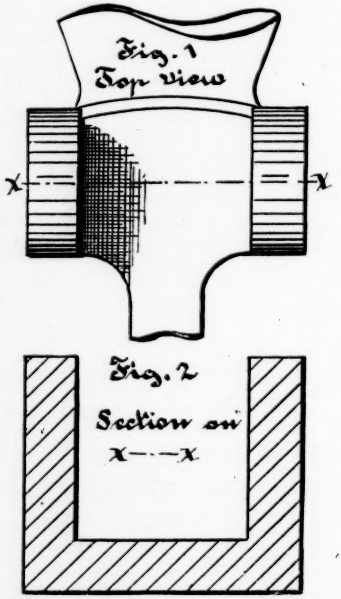
It is admitted that defendant in making its shackle-blanks uses first a cruciform blank substantially the same as used by complainant. It is agreed on both sides that defendant's next step is to take such cruciform blank and in dies make it into the shape shown in the next following drawings.

DEFENDANT'S INFRINGING BLANK.



It is admitted on all sides that defendant's next step in the manufacture of its shackle-blanks is to submit the shackle shown in the last drawing to dies which are partly illustrated in "Defendant's Exhibit, Defendant's Bending Dies," giving it the shape shown in the next following drawing. Upon this point the court below says: "The back is to be straightened and the arms are to be bent in a bending die in the same manner that these operations are performed upon the plaintiff's blank."

DEFENDANT'S BLANK AFTER FORMING UP.

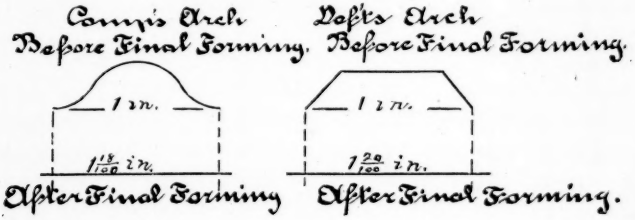


The court below states the question at this point as follows:

"It thus appears that the shape of the two blanks is different. One consists of a series of curves; the other consists of a series of angles. The question of infringement does not depend upon the form of the respective articles. If the straightening of the angularly-bent back of the defendant's blank pushes surplus metal towards the corners so that by means of this surplus, sharp instead of round angles are

formed when the arms are bent then the modification of shape is immaterial."

The court says something farther on this point which will be hereinafter discussed, but for the present we will deal with the proposition contained in the language just quoted. Defendant has furnished two blanks which it says in the evidence are of its manufacture, to wit: Defendant's "Exhibit Blank for Bending Dies," and Defendant's "Exhibit Bending Dies Bent Blank." Defendant says in the evidence that these two blanks are of the same size: that is, that the latter was made from a blank of the same size and kind as the former. It is evident from an inspection of the final bending dies used by defendant (partially shown in "Exhibit Defendant's Bending Dies") and from a comparison of Defendant's "Exhibit Bending Dies Bent Blank" that in the final bending and forming operation the arch formed by angles in "Exhibit Blank for Bending Dies" is flattened; and it is admitted by all parties to this controversy that in the similar operation performed upon complainant's patented blank, the arch formed by curves is flattened. Now, let us make diagrams side by side, using the exact size of "Defendant's Exhibit Blank for Bending Dies," (the under side thereof) showing complainant's arch before and after it is flattened, and in the same connection let us make diagrams showing defendant's arch before and after it is flattened, and see therefrom whether or not in the final bending process the action of the metal in complainant's and defendant's arches is similar; that is, whether in the flattening of these arches the metal is similarly pushed outward toward the corners of the shackle.



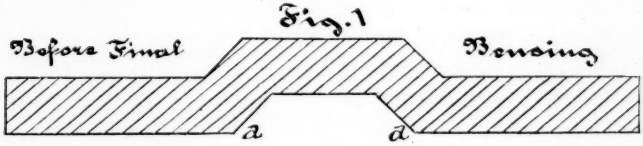
These diagrams accurately represent the inevitable and necessary action of the metal in the final bending dies wherein the arches are flattened. In complainant's arch whereas the direct distance between the ends of the arched piece before the final operation was one inch, after the operation it is one and eighteen-twentieths inch. In defend-

ants' arched piece whereas the direct distance between the ends of the arched piece before the final operation was one inch, it is after the operation one and twenty-hundredths inch. There is no room for doubt about this point. The evidence adduced by complainant is clear and explicit on this point, but if it were not so these diagrams are sufficient evidence of themselves, and apart from any expert evidence, to demonstrate the similarity in the action of the metal in complainant's blank and in defendant's blank when both are submitted to "a bending die in the same manner."

Complainant submits that it is a self-evident proposition that when two iron arches, differing only in the fact that one is made up of curves and the other is made up of obtuse angles, are submitted to precisely the same kind of operating forces, the action of the metal under such forces must necessarily be like and similar, and that though it may differ in the two structures slightly in degree, it can not differ substantially in kind. It will be remembered that we have already seen that in view of the prior art, complainant's improvement consists really in giving the back or body of the blank an excess of metal by disposing it out of a straight line to the end that that excess may be available in the final operation of giving the body or back sufficient material to form it entirely from outer angle to outer angle. Complainant confidently submits that defendant's blank has this same excess of metal in the body or back, attained by disposing that material out of a straight line, and that that excess of metal is made available in the final operation for forming the back of a shackle straight and flat from outer angle to outer angle, and that defendant's blank necessarily involves the improvement which complainant has made and patented.

A comparison of Defendant's "Exhibit Blank for Bending Dies" with Defendant's "Exhibit Bending Dies Bent Blank" is, as we think, sufficient of itself to establish our case. Figure 1 of the following drawing is a transverse section of defendant's "Exhibit Blank for Bending Dies." It is conceded by defendant (and if it were not, the fact is apparent on examination) that all the material which is to form the final back is contained between the points *a a*. The distance in a direct line between these points is one inch: the distance between these points measured along the surface of the blank is one and one sixteenth inches.

DEFENDANT'S BLANK.



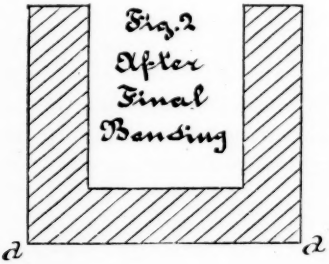


Figure 2 is the blank of Figure 1 after forming up, and the distance between the points *a a* is one and nine sixteenths inches, an elongation or pushing out of nine sixteenths of an inch, as compared with the distance in a direct line between these points in Figure 1, or an elongation or pushing out of five sixteenths of an inch as compared with the distance between these points in Figure 1 measured along the surface of the blank.

This elongation or pushing out of the material in the final forming up, is precisely the thing which is referred to in Clark's patent where it speaks of "the straightening of the body of the shackle pushing out sufficient material," &c.

"But," contends defendant, "the complainant's invention is not so broad as you state it: it is not sufficient for you to show that in the use of defendant's blank the metal is pushed outwards toward the corners; you must show that the very apexes of the angles are formed by such pushing out, whereas in defendant's blank and final operation the very apex of the outer angle is not formed by such pushing out of the metal, and therefore defendant does not infringe." We deny this contention of defendant; Mr. Clark was the first man to give the body or back of a shackle-blank an excess of length by disposing the material of that body or back out of a straight line to the end that such excess of material could be made available in

forming the back flattened straight from outer angle to outer angle; and he who thus disposes the material in the body or back of a shakle-blank out of a straight line, and then forces that back into a straight line, necessarily appropriates Mr. Clark's invention whether or not the very apex of the outer angles is formed by pushing out the metal.

The court below adopted the said contention of the defendant by using immediately, after the language of said court last quoted, the following:

"If, on the other hand, the angles are already formed of such shape and so definitely that no surplus material is needed or is furnished to the angles,, but the straightening of the back merely forces existing angles farther apart without a displacement of the material at the angles, then the two blanks are constructed upon a different principle."

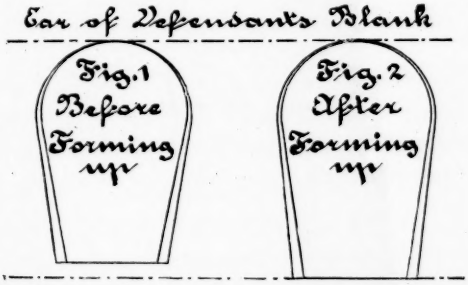
And the court farther proceeded:

"I am of opinion that the defendant's theory is the one which is better sustained by the testimony and the tests than the other, and that in the defendant's blanks there is no substantial upsetting of surplus of metal so as to form sharp angles. *The surplus metal is used in the elongated back*, and not in the angles."

Complainant submits to this court that the court below did not give complainant's improvement the full scope that it ought to have in view of the prior art; and adopted a construction of the claims, particularly the first claim, narrower than its terms and narrower than the invention. Complainant submits to this court that if the surplus metal of the curved or angled back becomes available in forming any part of the finally lengthened back, complainant's improvement is appropriated whether or not the metal is pushed outward to the very apexes of the outer angles, and that the flow and disposition of the metal in an arch, back or body, where one is curved and the other is obtuse angled, under the same kind of a final operation, is necessarily the same in kind.

But even if we adopt the exceedingly narrow and exceedingly technical construction of the court below, the defendant is still an infringer. This proposition is susceptible of establishment by an examination of exhibits, offered in evidence by defendant, to wit, by an examination of "Defendant's Exhibit Blank for Bending Dies," and "Defendant's Exhibit Bent Blank."

It is conceded by both parties to this cause, (and if it were not, the fact is apparent on examination) that the ears on defendant's blank suffer no material change as to width and thickness in the final operation as to forming up. Defendant's contention is that the obtuse angles to be found on defendant's blank before the final forming up become the right angles in the blank after forming up. If that be true it necessarily follows that the length of the ears is the same both before and after forming up; that is, the distance from the end of the ear to the obtuse angle in defendant's blank before forming up, must be equal to (or greater than) the distance from the end of the ear to the right angle in defendant blank after forming up. The next following figures of drawing are exact outlines of the ear in defendant's "Exhibit Blank for Bending Dies" before forming up, and defendant's "Exhibit Bending Dies Bent Blank" after forming up, for comparison as to this matter of length.

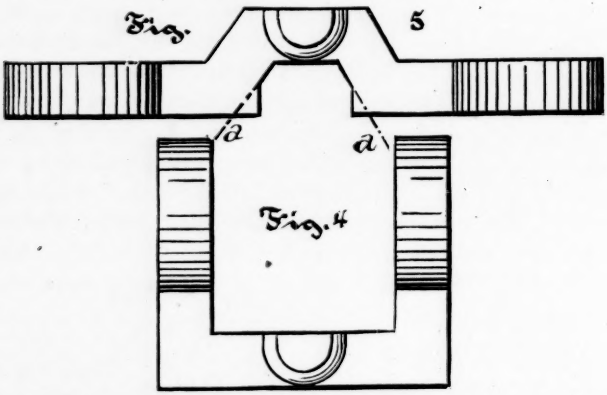


The length of the ear before forming up is 1 11-32 inches; after forming up 1 14-32 inches; that is, the ear after forming up is 3 32 of an inch longer than before forming up, and this increase *includes the entire angle*, which increase *had* to come from the curved body or back, proof conclusive that the elongation or "pushing out" of the metal in the straightening of the back extends to and includes the formation of the very apexes of the outer angles.

ANOTHER PROOF OF THIS FACT is contained in the patent which defendant offers in evidence and under which defendant assumes to work, the patent of W. B. Smith, No. 126,225, dated, August 9, 1870, Figs. 4 and 5, of which are reproduced, on the same scale as "Exhibit Blank for Bending Dies," in the next following drawings (except that certain dotted lines hereinafter referred to have been added to Fig. 4.)

The language next quoted from the specifications of said Smith patent refers to the blank of Fig. 4: "By the means of the elevation *C*" (in the dies) "the corners *h h*, at the junction of the ears *b b* and body *g*, are formed at right angles to each other."

FROM W. B. SMITH'S PATENT.



The language next quoted from the specification of said Smith patent refers to the blank of Fig. 5:

"It is then heated and the oblique portion of the body *g* bent so as to throw the ears *b b* upward in the form shown in Fig. 5, and in which operation of bending the corners *h h* remain unmolested whereby I am enabled to form the said corners square and full."

Yet this defendant now contends that it can and does cut off from the blank of Fig. 4 the right angled corners *h h* as indicated by the dotted lines *a a* (which gives the blank that defendant actually uses) and that the obtuse angles thus produced and located as they are, nearer the end of the ear, are—in the final forming up—still carried "unmolested" to the same point to which the angles of Fig. 4 are carried. The contention is an absurd one.

A THIRD PROOF of the incorrectness of defendant's contention on the precise point now under discussion is afforded by a comparison of the prick-punch marks on defendant's "Exhibit Blank for Bending Dies" with the appearance of the same marks on defendant's "Exhibit Bending Dies Bent Blank."

Defendant's expert witness, Mr. Earle, contends that in the final forming up of defendant's blank (Ans. 49): "There can be no pushing out of the metal toward the angle because there is already as much more metal in the vicinity of the angle than is required there, as the angle is greater than a right angle; therefore, instead of the surplus metal being pushed toward the angle *it must be pushed away from the angle* and toward the center, &c."

Let it be remembered to begin with that only one of the outer angles on Defendant's "Exhibit Bending Dies Bent Blank" is fully formed; the other outer angle is (by purpose or accidentally) left imperfect and incomplete. The complete angle shows the prick-punch mark largely filled up and obliterated. The incomplete angle fails to show as much obliteration of the prick punch mark, differing in that respect to just the degree that the angle lacks perfection and completeness: these facts have a bearing to show that defendant's contention that the angle remains "unmolested" in the final operation of forming up, is a mistaken contention; but that is not the point that it is now desired to particularly elucidate.

The point to which the attention of the court is now specially directed is that so far as the prick-punch mark shows at all, after the final forming up, it also shows that the metal in place of being forced *away* from the angle in the forming up—as defendant contends—is forced *toward* the angle.

It must be conceded that if the prick-punch mark were to remain more or less unfilled after the forming up, and its shape were to be altered in that operation, and the metal were in that operation to flow *away* from the angle, then the mark or hole would necessarily be elongated not transversely of the blank but longitudinally thereof. Now, an examination of the prick-punch marks at the angles of defendant's "Exhibit Bending Dies Bent Blank" shows that the prick-punch mark is elongated *transversely* of the blank, conclusively showing a movement of the metal *toward* the angle.

A FOURTH PROOF of the incorrectness of defendant's contention on the precise point now under discussion is afforded by the existence of a slight fin at the complete outer angle of defendant's "Exhibit Bending Dies Bent Blank" in line with the back, conclusively showing the forcing of the metal in the back toward and beyond the angle.

THE SECOND CLAIM.

Although the arguments so far advanced by complainant have been more particularly applicable to the first claim of the patent in suit, they have also been generally applicable to the second claim. The second claim differs from the first claim principally in specifying the "rounded corners" of the blank. Complainant confidently submits that defendant's change from a "rounded corner" to an obtuse angle is *merely* a change of form, and that the use thereof when the final angle is formed in precisely the same way that complainant's angle is formed, is not a substantially different thing, nor an avoidance of the complainant's patent so far as the second claim is concerned.

Respectfully submitted,

WM. EDGAR SIMONDS,

Of Counsel with Complainant.

113-79

Supreme Court of the United States.

No. 259. October Term, 1884.

JAMES B. CLARK, APPELLANT,

vs.

THE BEECHER MANUFACTURING COMPANY AND D. F. SOUTHWICK.

BRIEF FOR APPELLEES.

O. H. PLATT,
Counsel for Appellees.

WASHINGTON:
GIBSON BROS., PRINTERS AND BOOKBINDERS.
1885.

Supreme Court of the United States.

October Term, 1884.

JAMES B. CLARK, Appellant,

vs.

THE BEECHER MANUFACTURING COMPANY and D. F. SOUTHWICK, Appellees.

No. 259.

Brief for Appellees.

The question presented by the record is whether the defendants, appellees, have infringed.

A determination of this question involves the consideration of what was really secured to the complainant by letters-patent, and to what extent his alleged invention was limited by the language of the letters-patent and the prior state of the art.

The defendants, appellees, maintain that complainant's invention is limited in three essential particulars:

1. The blank must have a *curved* back or body, the sole purpose and function of the same being that the metal in the curved back shall in the process of bending or striking up be *pushed outward* to form the right-angled corners requisite to the completed shackle.

2. That portion of the blank where the arms or ears join the body must be "rounded on both the inside as well as the outside;" that is to say, there must be no previously formed corner or angle in that portion of the blank, and no

"projection" or accumulation of stock in that portion of the blank out of which the corner is to be formed.

3. As a necessary consequence the "arms of the blank" must be "bent into an oblique direction."

The prior state of the art, as detailed by Mr. Earle, (Record, page 46, question 17,) shows that the object sought to be accomplished was to make a blank of such shape that, in the subsequent operation or operations by which it should be converted into a shackle, the defect observable in complainant's "Exhibit old style shackle" should be avoided.

That this was the object to be accomplished also appears from, and is conceded by, Mr. Shepard's testimony for the complainant. (Record, pages 14, 15, 16, question 4.)

In other words, the patentee sought to produce a "blank" of such shape and character that, in forming the same into a "shackle," the deficiency of metal at the outside corners, naturally resulting from bending up the ends of a straight blank, should be so supplied in the operation of bending that the corners of the shackle should be "sharp, full, and square."

This had already been accomplished, both in the Thorp patent and in the Burns patent; in the Thorp patent by an accumulation of metal or stock at those portions of the blank which were to form the corners of the shackle, and in the Burns patent by forming the square corners in the blank itself. (Record, Reissued Thorp patent, pages 74, 75, 76; Burns patent, pages 71, 72, 73.)

[As neither the drawings of the complainant's patent, the Thorp patent, the Burns patent, or the Smith patent are printed in the record, they are here produced for convenience of reference.]

J. B. Clark.

Making Carriage Thill Couplings

No. 66,130 Patented Jun. 25. 1867

Fig. 1.

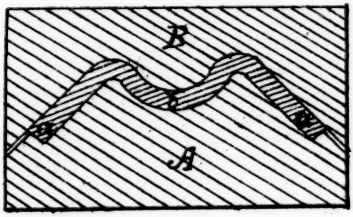
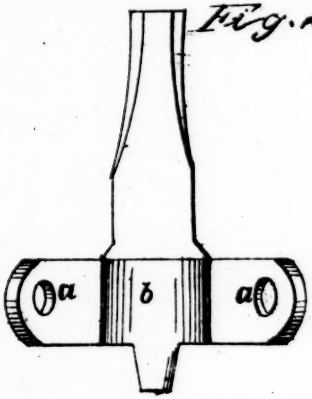


Fig. 2.



Witnesses

E. Ellsworth

A. M. Tanner

Inventor

Jas. B. Clark

Per Munn & Co

Attorneys

J. P Thorp

Making Carriage Countings

No. 28.114. Patented May 1 1860.

Fig. 1.

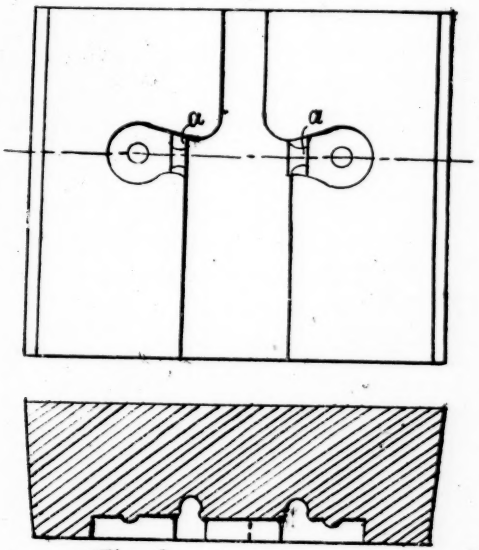


Fig. 3.

Fig. 2.

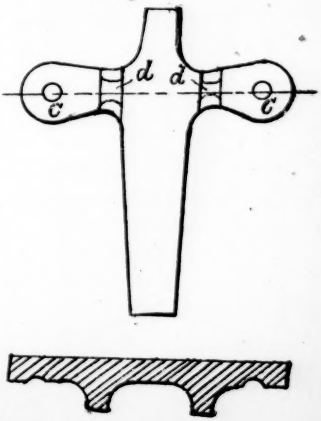


Fig 4

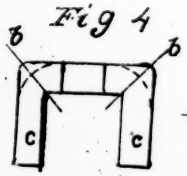
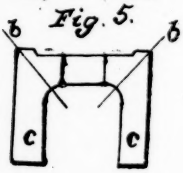
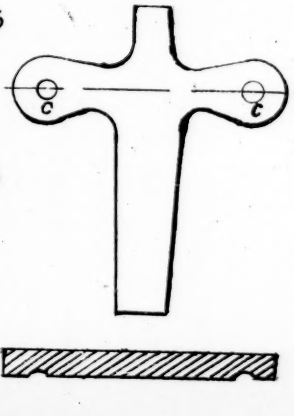


Fig. 5.





Witnesses
Edmd Callis
Jenny W Bey

Inventor
James P Thorp

"projection" or accumulation of stock in that portion of the blank out of which the corner is to be formed.

3. As a necessary consequence the "arms of the blank" must be "bent into an oblique direction."

The prior state of the art, as detailed by Mr. Earle, (Record, page 46, question 17,) shows that the object sought to be accomplished was to make a blank of such shape that, in the subsequent operation or operations by which it should be converted into a shackle, the defect observable in complainant's "Exhibit old style shackle" should be avoided.

That this was the object to be accomplished also appears from, and is conceded by, Mr. Shepard's testimony for the complainant. (Record, pages 14, 15, 16, question 4.)

In other words, the patentee sought to produce a "blank" of such shape and character that, in forming the same into a "shackle," the deficiency of metal at the outside corners, naturally resulting from bending up the ends of a straight blank, should be so supplied in the operation of bending that the corners of the shackle should be "sharp, full, and square."

This had already been accomplished, both in the Thorp patent and in the Burns patent; in the Thorp patent by an accumulation of metal or stock at those portions of the blank which were to form the corners of the shackle, and in the Burns patent by forming the square corners in the blank itself. (Record, Reissued Thorp patent, pages 74, 75, 76; Burns patent, pages 71, 72, 73.)

[As neither the drawings of the complainant's patent, the Thorp patent, the Burns patent, or the Smith patent are printed in the record, they are here produced for convenience of reference.]

In view of the previously-granted patents, Clark had then not only to produce a blank which, when bent, would make a shackle with full, sharp, and square corners, but had to avoid accumulations of stock called projections and corners already formed on his blank.

The object of his patent was not to make a blank which should produce a flat-backed shackle, for there was no difficulty in making a flat-backed shackle in various ways. All previous shackles had the flat back. The thing to be done was to get "full, sharp, and square corners" in the shackle without the slow process of hammering by hand, and without adopting any process already patented to others or known to the public; and therein alone consists the novelty of the patent if it has any.

The description of the invention in the specifications limits the invention to the object and purpose already suggested. It is confined to a setting forth of the method or plan adopted to produce a blank having neither "hindersome or impracticable projections," or corners already formed, but which by subsequent operations should be formed into a shackle with sharp corners.

The material part of the description is as follows:

"The arms *a a* of the blank are bent into an oblique direction, and the body *b* curved, as shown in the figure. The portion of the blank where the arms join the body is rounded, as shown both on the inside as well as the outside, the straightening of the body of the shackle pushing out sufficient material for forming the sharp corners without having any hindersome or impracticable projections. The dies are formed so as to give the blank the required shape."

It will be seen that nothing is said about the production of a flat back in the shackle from the blank; that no reference whatever is made to the shackle back, and the only reason given for the curved "body" and rounded corners of

the blank is that "sharp corners" are to be produced in the shackle by "straightening" the "body," thereby "*pushing out sufficient material*" *from the body to form such corners.*

It is true that the first claim of the patent does broadly claim the curved body of the blank, but the invention embraces both blank and dies. These are inseparable; and neither more or less can be claimed in one than in the other. The shape of the blank can only be claimed upon the ground that the peculiarity of shape leads to a new and useful result. The language of the first claim therefore must be construed and limited by reference to and in connection with the description of the *invention*, and the language of the second claim, wherein "the rounded corners and the curved body of the said blank" are spoken of and relied upon as being the only peculiar features of the blank which the dies are constructed to produce.

There is nothing novel or patentable in the shape of a blank abstractly. If a shape is patentable at all, it is only because, by means of the shape, some useful result can be attained in manner unknown before, and to give any validity whatever to the patent that result must be clearly specified and described by the inventor, and his exclusive right to produce blanks of the specified shape must be limited to the use of the same for the purpose described. In other words, he cannot be protected in the shape of his blank for any purpose not clearly described and claimed in his patent.

If, therefore, the curved body, oblique arms, and rounded corners of the blank either separately or conjointly are supposed to be useful for some purpose not described, specified, and claimed in the patent, they are not secured thereby for such purpose.

For instance, if it should be claimed that a shackle pro-

duced from such a blank is stronger by reason of the peculiar shape of the blank, that result must be described in the specification as in the Thorp patent.

So if it be claimed that such a blank by reason of its shape will, when straightened or struck up, produce a shackle with a flat back, that feature, if patentable—which we deny—must be clearly described and claimed in the patent.

So if it be claimed that by means of the curved body of the blank additional length or stock is provided, which goes to make the back of the shackle irrespective of the "full, sharp, and square" corners, it is plain that the curved body is not secured by the patent for such purpose.

We then are forced to the conclusion that the only peculiar feature in the complainant's blank which, under his description or claim, and in view of the prior state of the art, is or could be the subject of a patent, is *the curved body and rounded corners, the object of the same being the furnishing of metal to be pushed out to form sharp right-angled corners in the completed shackle.*

In support of this construction and limitation of the complainant's patent, we refer to the very clear, positive, and convincing testimony of Mr. Earle. (Record, question 4, pages 40, 41, and 42; question 6, pages 42, 43; questions 7 and 8, page 43; question 12, page 45; question 14, page 45; cross-questions 33, 34, 35, 36, pages 49, 50; redirect question 82, page 58.)

It will be observed also that Mr. Shepard, the complainant's expert, seems to have held the same view of the extent, scope, and purpose of the complainant's patent until, during the progress of the case, he discovered that upon that view there was no infringement by the defendants, for on his direct examination he says, (Record, question 4, page 14:)

"It is desirable to form the shackle with sharp, full, and square corners at the junction of the outside of the ears and the back. The object of this invention is so to form the blank which is to form the shackle that when the shackle is formed up in the usual way *sufficient metal will be pushed out from the back for forming the sharp corners before referred to.*"

When he says, a little farther on, that the peculiar novelty of the blank consists in the curved or crooked body he must be understood as referring to the object or result to be attained, which he has already stated, rather than to any mere novelty of shape, for he says:

"Compressing the back to straighten it upsets the metal in the curved portion and pushes it out towards the outside corners to fill any deficiency which may have been caused by bending up the ears, thereby leaving the corner sharp and full. * * * By making the back of the blank curved or crooked it may be left of a uniform thickness without any attempt to form sharp corners in the blank or without any surplus metal at that point such as would constitute a 'hindersome and impracticable projection;' or, in other words, a blank may be left of such shape that *bending up the ears will leave a rounded outside corner, because the straightening of the back or body will upset and push out sufficient material to perfect the corners and make them sharp and full.*"

Mr. Shepard in his rebutting testimony, (Record, pages 36, 37, 38, and 39,) seeing the necessity of avoiding our construction and limitation of complainant's patent, very ingeniously seeks to give it a broader scope, and says, among other things:

"The novelty of the second method resides in first forming the ears straight while the back is curved, and afterwards forming the shackle by bending the back so as to straighten it."

And claims that the complainant's blank covers accumulations of stock at the point where the ears are to be formed, the ears not being in a straight line with the back.

All this is an after-thought, and not his original conception of the complainant's patent.

If the construction claimed of the complainant's patent be correct, the defendants do not infringe, because—

1st. The blank of the defendant, instead of rounded corners at the intersection of the arms with the body, has sharp corners formed in the blank, which are not disturbed in the bending process, but are the identical corners in the finished shackle.

2d. The metal in the body of defendant's blank is not pushed out and does not go to form the sharp corners of the completed shackle.

3d. The arms are not bent obliquely. Compare complainant's "Exhibit Clark's dies and blank" and "Exhibit No. 1."

The complainant, through Mr. Shepard his expert, insists that in bending up "Exhibit No. 1," "the back will be straightened and upset so as to push out stock to make full and square corners, the same as already described, as a result of bending the curved back of the Clark blank."

He says also, in substance, that the body of our blank is made up of angular bends, the effect of which is to increase the length of that portion of the blank, and in the process of bending produce precisely the same result as in case of the bending up the blank of complainant's patent, having the curved body, the rounded corners, and oblique arms, and he therefore considers the "angular bends," as he calls them,

the full equivalent of the curved back. (Record, question 6, page 17.)

Mr. Shepard is mistaken, and his mistake is the result of two erroneous assumptions:

First. That in the process of bending or striking up the blanks, the heated metal when struck by the hammer will be moved and distributed in precisely the same way in the defendants' as in complainant's blank, so that in defendants' blank metal will be pushed out *to form the corners.*

Second. That there are no corners already formed in defendants' blank.

Both of these assumptions are clearly shown to be fallacious by the testimony of Mr. Earle and conclusively demonstrated to be so by the defendants' exhibits "Blank for bending dies" and "Bending dies bent blank."

The testimony of Mr. Shepard is purely conjectural and speculative, for the record shows not only that he never saw a blank, such as is claimed in complainant's patent, bent into a shackle, but that no such blank ever was bent into a shackle with full, sharp, and square corners. Mr. Earle's testimony, on the other hand, is based upon the actual bending of defendants' blank. Mr. Shepard swears to what he assumes on theory to be the case; Mr. Earle to what he saw demonstrated. (Record, Earle: Question 6, pages 42, 43; questions 7 and 8, page 43; question 9, pages 43, 44; question 10, page 44; question 11, page 44; cross-questions 43, 44, page 51; cross 48 to 60 inclusive, pages 52–55; r. d. questions 75 to 82, pages 57–59.)

Until the mathematical axiom that two bodies cannot occupy the same space at the same time is proved untrue, no metal can be pushed out from the body of defendants' blank "Exhibit No. 1" to form the sharp corners of the shackles, for sufficient metal is already found in the blank at the

points which are to be the corners of the shackle, and such corners are already defined and formed in the blank. There is no space into which metal can be pushed, as is the case in the defendants' blank, owing to its "rounded corners."

If the metal in the immediate vicinity of the corners is pushed either way in bending, it is pushed away from the corners—pushed *in* instead of pushed *out;* for the angle in the blank being obtuse, and the angle of the corners of the shackle being a right angle, it follows that there is already more in the vicinity of the points in the blank where the corners are to be formed than is needed there. The complainant's blank is deficient in metal in that vicinity; there is no deficiency in the defendants' blank; and this difference in the two blanks is an essential and radical one. If there is any surplus metal in the vicinity of the points which in defendants' blank form the corners of the shackle, it must go into the back, for it cannot go into the corners of the shackle.

Mr. Shepard does not answer this on page 39, question 11, of the record, for whatever else may be done in bending the defendants' blank, the corners in defendants' shackle are not produced in precisely the same way, as the "bends in the Clark blank are molested and transformed into sharp corners when the Clark blank is bent up into shape."

This is conclusively shown by the fact that the prick punch-mark on the corner of "Exhibit bending dies bent blank," is as deep as when it was first made. The metal as far distant from the corners as the depth of the prick punch-mark certainly has not been disturbed in the bending process.

The complainant has undertaken the hopeless task of maintaining a theory after a practical experiment has demonstrated its unsoundness.

The judge on the circuit was convinced by the demonstration that metal was not *pushed out* to form corners in the

defendants' shackle. He could examine "Exhibit bending dies bent blank" and *see* that it was not; but the complainant, having assumed that theoretically defendants' blank was like complainant's blank, refuses to be convinced even by ocular demonstration.

The fallacy of the complainant's argument consists in assuming that his patent covers a *bent* blank body, without regard to the object to be accomplished by such construction, and without reference to the fact that no angular corners are formed on his blank. If, as he seems to suppose, his patent covered the curve in his blank without reference to the object of his curve, and secured to him arbitrarily the mathematical shape of his blank, there might be some ground for his claim that the shape of our blank is an equivalent for the shape of his. The important inquiry, however, is. What new and useful purpose is subserved by the curved body of his blank? To this inquiry there can be but one answer, namely, that owing to the curved shape of the body of the blank, the hammer descending upon it when it is heated and the ears are being bent up, falls upon the top of the curve as upon the crown of an arch, thereby upsetting all the metal in the curved body, and giving it a lateral motion sufficient to drive the same into the unoccupied space resulting from his rounded corners, that unoccupied space being increased by the bending up of the ears of his blank; or, in the words of the patent, by "pushing out sufficient material for forming the sharp corners" where none existed before.

In case of the defendants' blank, owing to the plane surface upon which the hammer first strikes in falling, there is no upsetting of the metal beneath the plane surface, but the same is simply forced downward; there is not, and there cannot be, any lateral movement in that portion of the metal in the body of the defendants' blank.

The only portions of the body of the defendants' blank in which, under the blow of the hammer, there can be any other than a downward movement of the metal are those portions between the ears and the upper plane surface of the body; and it is perfectly apparent, for reasons already shown, that the movement of the metal in those portions is not towards the points but away from them.

If this conclusion were reached only by a process of reasoning it would have all the force of a demonstration.

This conclusion, however, is shown to be correct beyond doubt or question by an examination of the exhibits "Blank for bending dies" and "Bending dies bent blank."

If the metal in the latter exhibit had been pushed out from the body of the blank so as to form the square corners of the shackle, the prick punch-mark would have been entirely obliterated, whereas it is perfectly clear, distinct, and untouched on the side of the shackle.

Again, if there had been any lateral motion of the particles of metal adjacent to the corners, those portions of the prick punch-marks which were on the body side of the angle, at least, would have entirely disappeared from the back of the shackle, whereas they are in fact still visible, having been only partially filled in by the downward motion of the metal when the body was driven down to form the back of the shackle.

How it can still be contended, after this experiment and its results, that in defendants' blank the metal in the body is either pushed out *to form* the corners, or is pushed out towards the corners, it is hard to see.

A great deal of stress seems to have been laid upon the alleged shortening of defendants' blank as a whole, in the striking up or bending process.

The fact of shortening is not proved; it is claimed by complainant and Mr. Shepard as the result of their measurement, and denied by Mr. Earle as the result of his measurements.

The testimony seems, on the whole, to show that if the lower side of the shackle is measured it will appear to have been lengthened; if the upper side is measured it will appear to have been shortened. If the mean of the two measurements is taken no substantial difference between the length of the blank and the shackle appears.

But whether the blank is lengthened or shortened in the bending process is not important to this issue; the ears, down to the angle point, remain of the same length, and if any shortening has taken place it is because the metal in the back of the shackle is thicker or broader than in the body of the blank—a result depending in each blank on the force of the blow.

Counsel for complainant, in cross-questions 48 to 58, inclusive, (Record, pages 52–54,) and Mr. Shepard, in answer to question 4, (Record, page 37,) seems to suppose that because the angles or corners are farther apart in the exhibits "Bending dies bent blank" than in "Blank for bending dies" it shows that metal has been pushed out from the back of the blank into the corners of the shackle. This is clearly a mistake, as is plainly shown by Mr. Earle in his answers to cross-questions 48 to 58, (Record, pages 52–54,) before alluded to, and in his answers to questions 75 to 79, on pages 57 and 58 of the Record.

The corners have been forced apart by driving the metal of the back down between them, but they have not been changed—they exist in the shackle as they did in the blank before it was struck. They have been separated more widely, but the metal of which they are composed is the

same in the shackle as it was in the blank, and has not been forced there from the body of the blank.

If the complainant's patent were broad enough to cover the making of a flat-backed shackle from a blank having a raised body, and the separation of the angles of the blank by driving its body down between them, we should infringe; but as he has no such patent we do not infringe.

There is a class of testimony not heretofore alluded to which incidentally leads to the same conclusion. The patent of the complainant is at best a theoretical patent, and he has never been able to reduce his invention to practice. The only blank and shackle produced by him as showing his invention, until his rebutting testimony was taken, was the blank "Exhibit Clark's dies and blank" and the shackle "Clark's shackle." These were introduced and testified to as if the blank had been struck in a die and the shackle formed in a bending die from a blank like the one exhibited.

So the defendants supposed until a subsequent examination of the exhibits led them to suspect otherwise, and a subsequent cross-examination of Mr. Shepard and Mr. Clark (to be found on pages 27 to 31, inclusive, of the record) developed the fact that the blank used as an exhibit had been made from a finished shackle manufactured by H. D. Smith & Co., under the Thorp patent, by heating and hammering so as to change its form; and the shackle exhibited was one also made by H. D. Smith & Co., under the Thorp patent, the tops of the ears having been cut off for some purpose.

It also appears from the testimony of defendants' witnesses, Smith and Garvin, that the only attempt ever made to reduce complainant's invention to practice was by J. B. Savage, of Southington, who found it impossible practically

to manufacture marketable shackles from blanks constructed according to complainant's patent; that the forms of the blanks and of the dies producing them were changed from time to time by Mr. Savage, by dropping the ears of the blank more nearly to a straight line, producing an accumulation of stock at the point where the corners of the shackle were to be formed, until finally the blank was made with the ears substantially in the same plane, the rounded corners were dispensed with, and substantially formed angles substituted therefor, until the blank was no longer the blank covered by the complainant's patent, but was like the blank shown in the Willis B. Smith patent, under which the defendants manufacture.

Mr. Earle's testimony is to be found in his answers to question 22, cross-questions 35, 36, 37, 38, and 39, page 48 and page 50 of the record.

The testimony of the witnesses Smith and Garvin on pages 59 to 69, inclusive, of the record.

And the alterations made from time to time will be seen by a comparison of defendants' exhibits "Clark's die," "Clark's old shackle blank," "Savage's modified Clark blank," "First alteration Clark's blank," "Savage's last modification Clark's blank."

Mr. Garvin, who is a shackle forger since 1867, testifies very clearly that it was impossible to produce a square corner from a blank of the shape "Exhibit Clark's old shackle blank," or from the blank "First alteration of Clark's blank," without more stock on the corners; and it was only when, after various alterations, the blank finally assumed the shape of "Exhibit Savage's last modification of Clark's blank," that he was enabled to forge shackles with sharp corners. The difficulties encountered, and the final abandonment by Mr. Savage of the effort to make shackles under the Clark patent, are stated by Willis B. Smith in his testimony.

It is true that after this testimony had been produced, the witness Clark produced a blank and a shackle, which he says he made from a similar blank, the two being marked "Exhibit No. 7," but the circumstances under which they were made, as detailed by him, are such that they do not disprove the testimony of Smith and Garvin as to the impracticability of making marketable shackles under the complainant's patent.

From the testimony of Smith and Garvin we reach the same conclusion already stated, that the distribution of metal in striking up shackles differs in case of the defendants' blank from that which takes place in striking up shackles from the complainant's blank. It was not until the form of the Clark blank had been changed by the addition of stock and practical substitution of angles for rounded corners that marketable shackles with square corners could be produced. In other words, it is unnecessary either in the defendants' blank, or in Savage's last alteration of the Clark blank, to push metal outward to form the square corners of the shackle, and such pushing out does not in fact exist. While in the blank described in complainant's patent such pushing out of metal to form the sharp corners of the shackle is necessary, and though we may admit that a shackle with square corners may, under favorable circumstances, be formed from such a blank, it is impracticable to practice the invention successfully in the business of manufacturing shackles.

For the reasons given it is insisted that the judgment of the court below, holding that the defendants have not infringed any invention covered by the complainant's patent, should not be reversed.

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